

MINING CONGRESS JOURNAL



OFFICIAL

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AMERICAN MINING CONGRESS

METAL MINING CONVENTION & EXPOSITION

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MINING CONGRESS JOURNAL

Vol. 26

JUNE, 1940

No. 6

Outstanding recent accomplishments in ventilation improvement at metal mine operations have been chalked up by Climax Molybdenum Company and Sunshine Mining Company—the former including not only a revamping of the underground system but also extensive changes resulting in improved air conditions in the surface plant. Watch for detailed accounts of these developments in subsequent issues of the JOURNAL.

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—Photo courtesy The New River Co.	
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Opinions expressed by authors within these pages are their own, and do not necessarily represent those of the American Mining Congress

Published monthly. Yearly subscription, United States and Canada, \$2.00. Foreign, \$4.00. Single copies, \$0.20. Entered as Second-Class Mail Matter, January 30, 1915, at the Post Office at Washington, D. C.

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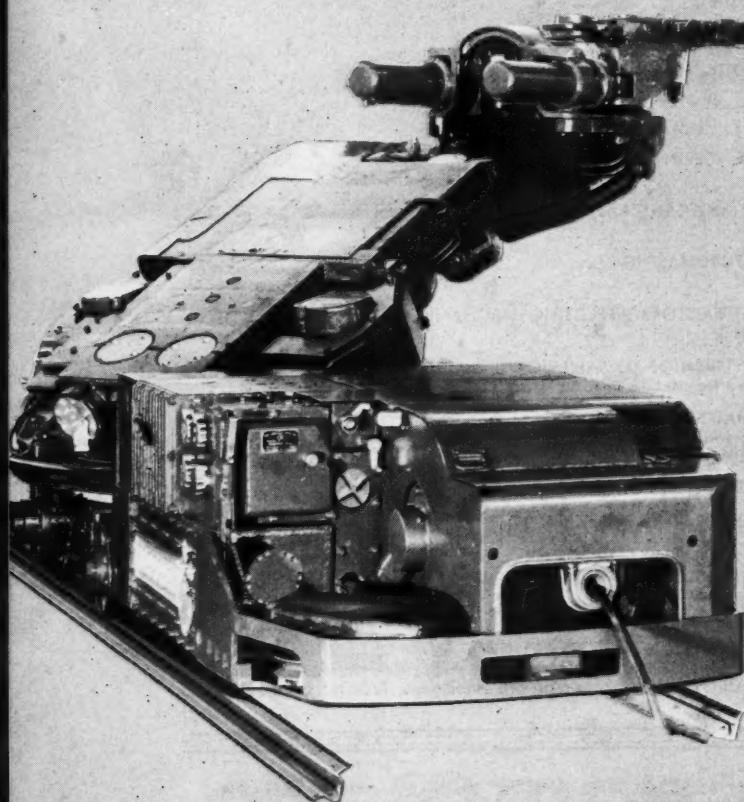
THE AMERICAN MINING CONGRESS

309 Munsey Bldg., Washington, D. C.

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At the face...

HIGHER CAPACITY, LOWER-COST PRODUCTION IS INITIATED BY JEFFREY COAL CUTTERS

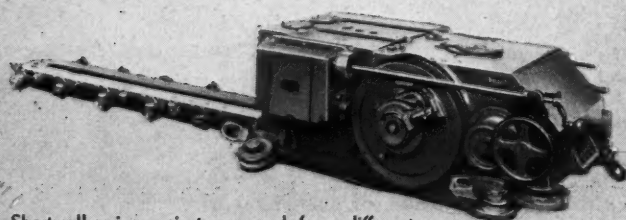


*Engineered
Economy*
ALL ALONG
THE LINE

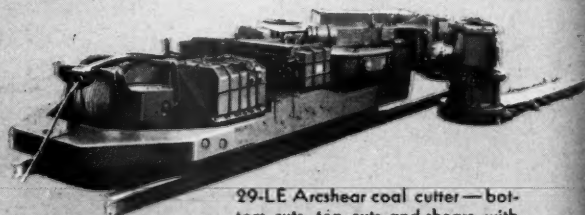


Topping the broad Jeffrey line of coal cutters is this track-mounted, hydraulic controlled 29-U Universal machine. Flexible as a skilled arm and hand, short bodied, close coupled and compact without sacrifice of accessibility, the 29-U Universal cutter cuts anywhere in the seam. This unit will 'key' your production to a truly profitable tune.

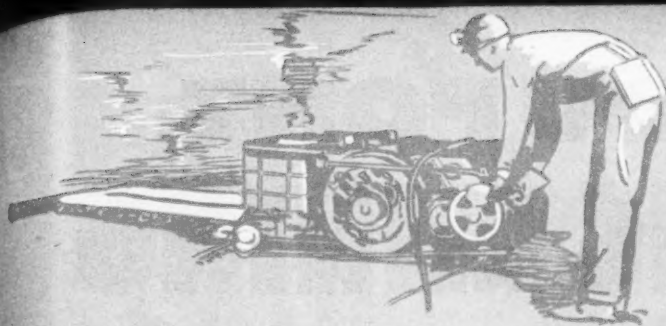
Patented and Patents Pending. Also licensed under the patents of E. C. Morgan. Patents Nos. 1706961, 1706962, 1707132, 1707133, 1953325, 1953326.



Shortwall series — six types, each for a different purpose, including three for conveyor mining. Highly standardized units with high capacities... fewer and slower moving parts, greater compactness and effortless operation. Investigate the Jeffrey '35' series Shortwalls.



29-LE Arcshear coal cutter — bottom cuts, top cuts and shears, with range of adjustments to suit height of seam. Mechanically operated controls and is applicable where the universal cutting range of the 29-U is not required.



AND DRILLS

Jeffrey equipment offers you an opportunity for increased profit throughout every phase of coal mine production.

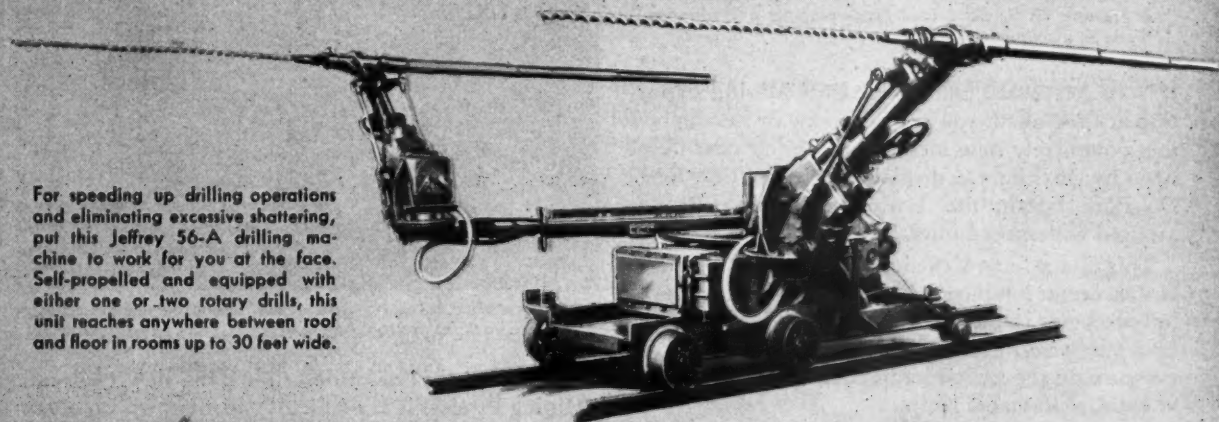
The speed and capacity of production all along the line is set at the face. It is logical that Jeffrey engineering should effect maximum efficiency at this initial operating point. In its broad line of cutters and drills, Jeffrey "engineered economy" is more than just a catch phrase. It is the result of more than sixty years of construction and installation experience . . . of familiarity with operating problems and their most practical solution.

Figured on the basis of initial cost, increased efficiency, easy operation, long life and low maintenance, Jeffrey cutters and drills represent the kind of investment that get your profits off to a flying start . . . to be protected, even accelerated later by other Jeffrey equipment. With this other Jeffrey equipment, the "engineered economy" begun at the face continues at all important production points.

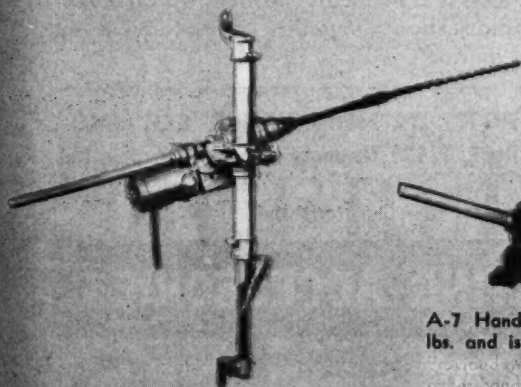
Send for descriptive literature covering Jeffrey coal cutters and drills.

THE JEFFREY MANUFACTURING COMPANY

912-99 North Fourth Street, Columbus, Ohio



For speeding up drilling operations and eliminating excessive shattering, put this Jeffrey 56-A drilling machine to work for you at the face. Self-propelled and equipped with either one or two rotary drills, this unit reaches anywhere between roof and floor in rooms up to 30 feet wide.



A-6 Post Drill — a low cost, high speed unit for coal mine service. Being light in weight it is easily handled. Also A-5 post drills.



A-7 Hand-held Drill — weighs only 40 lbs. and is easily handled by one man.

For continued efficiency, use spare parts identical point for point with those they replace . . . **JEFFREY SPARE PARTS ARE MANUFACTURED TO PRECISELY THE SAME HIGH STANDARDS AS GOVERN ORIGINAL EQUIPMENT**

THE NEW DU PONT HYDRAULIC MINING PROCESS



● Starting to break a coal face—placing a Hydraulic Tube in a center hole.

IF YOU ATTENDED the recent Coal Mining Exposition at Cincinnati, you probably saw or heard about this completely new method of mining coal developed by Du Pont. On display for the first time in the Du Pont booth, the Hydraulic Mining Process aroused widespread interest.

This is a safe and efficient process that produces larger, firmer lump coal. Expansible tubes are placed in bore holes in the working face. Oil is then forced by a pump into these tubes. Their expansion exerts pressure on the surrounding coal, bringing it down in solid, marketable lump.

Infinitely greater safety is provided because—

- ... there is no source for the ignition of gas;
- ... there are no noxious fumes or smoke;
- ... there is no noticeable harmful effect on the roof;
- ... there are no flying rocks, coal or shells.

*Makes better lump...
gives
greater safety!*



● The entire cut is brought down. About 60 tons of firm, coarse coal set out for easy loading.

An illustrated booklet describing the new Hydraulic Mining Process is available. Write for a copy to obtain complete information about this efficient and safest method for mining coal.

E. I. DU PONT DE NEMOURS & CO. (INC.)
Explosives Dept., 13423 Nemours Bldg., Wilmington, Del.

NOTE: Visit the DU PONT Wonder World of Chemistry Exhibit at the New York World's Fair.



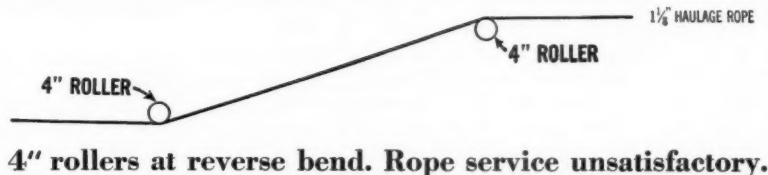
EXPLOSIVES and BLASTING ACCESSORIES

WHO SAID

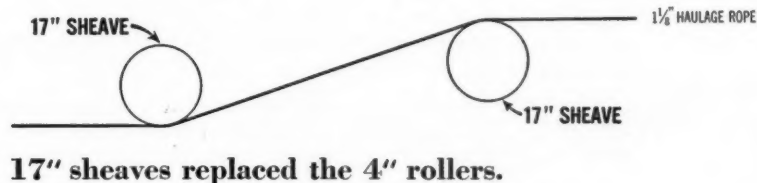
"Wire Rope Reeving Isn't Important"?



BEFORE



AFTER



RESULT

Rope Service almost Doubled!

This is an *actual* case history. Not an isolated case. But a typical example of what can be and is being done to increase rope life through proper wire rope reeving.

There is nothing complicated about proper wire rope reeving. It's simply a matter of watching the things that are easily overlooked—avoiding reverse bends whenever possible, making sure that sheaves are large enough, that sheave grooves are in proper condition, etc. The additional examples

to the right are typical of what can be done. And they pay big in results.

To obtain maximum safety and service from wire rope—watch wire rope reeving. And feel free to consult our local representative—who will gladly make available to you our years of experience with every conceivable kind of reeving problem. His suggestions may point the way to worthwhile savings.

JOHN A. ROEBLING'S SONS CO.
Trenton, N. J. Branches in Principal Cities

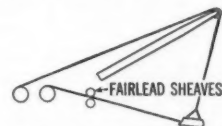
This advertisement is published in the interest of all wire rope users, to help them obtain greater safety, service and efficiency from their wire rope.

ROEBLING

Wire Rope



SOME OTHER "REEVING POINTERS" THAT INCREASE ROPE LIFE



Dragline sheaves replaced—rope life tripled!

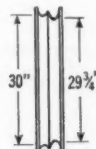
An Illinois coal company replaced worn Fairlead sheaves with larger sheaves of harder material. Result—average service of five ropes almost tripled that of five ropes used before.



Larger knuckle sheaves increase rope life 45%!

By installing 30" sheaves to replace 16" rollers on an inclined haulage, an Alabama mine has obtained 45% greater average tonnage from their last five 1 1/2" haulage ropes.

Look Out For This!

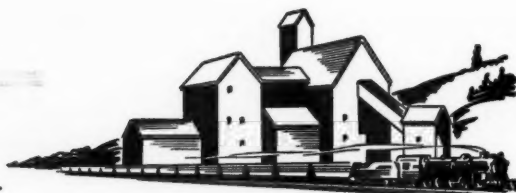


One company received only 9 months' service from set of four 1 1/2" ropes. Trouble caused by uneven wear of double sheave grooves.

Machining grooves to same depth cured the trouble. New ropes in excellent condition after one year's service—and capable of rendering two to three times service of previous set.

Ask about ROEBLING "RIIF CENTER" WIRE ROPE

either standard or professional



Class Legislation

THE writer has frequently urged that laws which protect only a small part of those forced to obey them do not and never will lead to justice or to real prosperity.

Most of the labor legislation of recent years has been designed for the protection of organized labor. At one time it was estimated that five million of the fifty million workers (those who get their living from personal effort and not from capital earnings) were members of labor unions. Now this membership is approximately doubled, but still four-fifths of our workers are ignored in much of our labor legislation. There can be no equality in the labor world, there can be no uniformity in living conditions so long as forty million relatively low paid workers are forced to buy goods produced by dollar-an-hour workers. A government which lends itself to the continuance of such conditions *must* look for foreign trade, even to its subsidy, in order to maintain a semblance of prosperity at home.

The maintenance of purchasing power by Federal relief has as much to say for itself as the maintenance of industrial employment by the subsidized sale of goods in foreign markets. Both are unsound in principle and in practice.

To remedy this situation does not require that the wages of the skilled artisan shall be reduced to the wage level of common labor, but it does require that the consumer cost to the forty million unorganized workers shall be based on the wages which they get and not upon production costs based on wages four times greater. So long as this differential prevails there can be no universal prosperity.

In considering this problem we must not lose sight of the fact that money is only a token, and that high wages in a high priced market leave only about the same surplus as is left from low wages in a low priced market. The world consumes what the world produces. If production is too great, falling price levels open the door to business depression; if production is less than consumption requirements, the result is high prices and want.

The relation between wages and price levels is a fixed relation. The price level of necessities based on high wages brings havoc to the lower paid worker, and except for the background of farm and garden this would result in want and despair. Increased aid to the worker from farm and garden may well be the best possible substitute for full employment—the more of our workers who are on the farms where a large part of living requirements are produced by the worker, the less will be the drain on public funds and the more of independence for those who so labor.

Such aid from increased home gardening or even from a back to the farm movement may modify but will never be a remedy for class legislation enacted for the benefit of any minority.

J. H. Calverath

MINING CONGRESS JOURNAL

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No. 6

Richard J. Lund, Editor

MINERALS AND THE ARMAMENTS PROGRAM

FACED with an unprecedented peace-time armaments program—in fact, one which probably will rival in intensity that of the World War I days of 1917-1918—it is comforting to know that in our capacity to produce the bulk of mineral raw materials used in making the airplanes, tanks, guns, ships, ammunition, etc., needed to give adequate protection, together with the fuel supplies to operate them, the United States stands far ahead of any potential enemy. Regardless of whether a swift knockout blow is handed the Allies before the productive capacity of this country can be drawn upon to supply the matériel so vitally needed by them, the race to provide adequate defenses for the protection of the Western Hemisphere against the ravages of modern warfare will no doubt continue for some time.

Among the so-called "bulk" mineral materials vital to this program are iron ore, copper, lead and zinc; and fortunately our mines producing these metals are in good shape to undertake full capacity operations almost at once. In the case of zinc, and possibly of copper, idle mines may have to be opened if the demand reaches heavy proportions. In the event prices should be frozen at approximately present levels, some form of government subsidy would be needed to meet the higher costs in these sub-marginal properties. Oil may be had in virtually any amount by merely opening the well valves, and facilities to produce the necessary supplies of fuel oil and gasoline are excellent. The productive capacity of our coal mines is more than ample to meet virtually any conceivable demands for fuel to power the nation's normal manufacturing plus armament industries, and to supply steam for expanded transportation needs.

So much for the "bulk" minerals with which we are plentifully supplied.

Equally as important, though used in relatively small amounts, are other minerals of which the United States unfortunately does not have supplies commensurate with her needs—the so-called strategic or critical minerals. Embraced in this category are such metals as tin, manganese, chrome, tungsten, mercury, aluminum, antimony, vanadium and nickel. Our status with regard to these ranges all the way from virtual self-sufficiency to almost complete dependence on outside sources.

After a hard struggle lasting over many years, proponents of a policy of stockpiling certain of these minerals finally won out a little over a year ago; but unfortunately the sums made available for purchase were woefully inadequate. This purchase program was sup-

plemented by provisions for exploration and development work by the Geological Survey and Bureau of Mines, the results of which may in time lead to material benefits. What is most urgently needed now, however, are actual supplies of such items as tin, manganese and chrome. Of what value are the appropriations and even facilities for fabricating 50,000 military and naval planes, thousands of tanks, anti-aircraft guns, field pieces, etc., when certain vital raw materials needed in their construction are not on hand or even immediately available in sufficient quantities across the seas?

These are the problems faced by the newly-formed National Defense Committee. The President is to be commended for his choice of E. R. Stettinius, Jr., to head up the important work of seeing that adequate supplies of these raw materials flow unceasingly from mines to factories. Named just recently as one of his assistants is C. K. Leith, eminent authority on world minerals and adviser to the government on similar matters in the last war. Certain it is that these men will be given fullest cooperation by mineral producers in meeting requirements of this vital program.

One aspect of the problem seems worthy of special comment. In past bids on government purchases of strategic minerals, there have been instances where, although the bids and promises to deliver in a specified time may have been made with the best of faith, the apparently insurmountable initial odds against fulfilling the contract proved only too true—and vital supplies which could have been otherwise obtained promptly were held up for months and months. In a critical time such as this there is no place for selfish personal gambles when the future welfare and security of the entire Nation is at stake.

Provisions for outright government help in the search for and development of new sources of strategic mineral wealth would be eminently worth while for safeguarding the future. Legislation of this nature—the Murray Bill—has already been introduced in Congress, and the American Mining Congress has made an appearance favoring its passage. This bill would authorize \$10,000,000 for single loans of up to \$40,000 for development of gold, silver and strategic and critical minerals—such loans to be made by the Reconstruction Finance Corporation. This bill has been reported favorably to the Senate by the Banking and Currency Committee, and stands a good chance of passage. Representative Scrugham has introduced a similar bill in the House.

Discussion of the role of the mineral industries in the armaments program would be decidedly incomplete without reference to the immediate need of reasonable amendments to the Wagner, Wage-Hour and Walsh-Healy Acts. It is quite apparent that full capacity operations are needed to produce the mineral raw materials necessary to fulfillment of the program in the time available, and to do this without marked increases in prices to meet heavier labor costs will necessitate full cooperation by labor and management—to be accomplished only through action *now* in relaxing or removing the many rigid and one-sided provisions contained in these laws.



Montana has produced from 1862 to date
about \$3,352,000,000 in mineral wealth

The Significance of

MONTANA'S MINERAL INDUSTRY*

MONTANA owes her existence both as a territory and a state to the wealth of mineral resources which Mother Nature placed in that portion of the earth's crust contained between the 45th and 49th parallels of North latitude and extending from 104° to 116° West longitude.

Montana has produced from 1862 to date approximately 3,350 million dollars in mineral of all kinds or about \$23,000 for every square mile of the state's area, and as staggering to the imagination as this fact seems to be I am willing to make the bold prediction that the future production of the state unquestionably will exceed by far that of the past.

Great Coal, Oil and Gas Reserves

In justification of this apparently wild statement, let me remind you that eastern and central Montana contains, according to estimates of the United States Geological Survey, 400 billion tons of known minable coal which represents $\frac{1}{8}$ of the United States supply and $\frac{1}{12}$ of the known world supply. Now if we place a value of only 1 cent per ton on it we

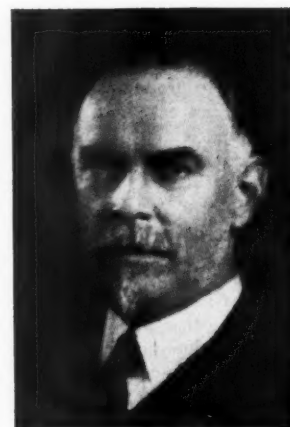
* Address delivered at Convention of the Montana Mining Association.

● Optimism Voiced Over Future Outlook Based On New Discoveries Coupled With Exploitation of Known Reserves

get 4,000 million dollars for this one resource alone, and I presume all of you will admit that 1 cent per ton is a ridiculously low estimate.

But Montana's mineral future fortunately does not rest upon her coal resources alone—for great as these are, anyone who is as realistic as every member of the mining engineering profession is under obligation to be, must recognize that this great coal reserve is an asset of the ultimate rather than of the immediate future. Nevertheless, on this one asset alone it is evident that my statement is justified. To this great fuel resource of the future must be added the undeniable possibility of further oil discoveries from known productive horizons as well as from deeper horizons within the boundaries of the state and much the same thing can be said with regard to natural gas where geologic conditions are favorable.

However, most of the members of this convention are hard rock miners,



By FRANCIS A. THOMSON

President
Montana School of Mines

and the Montana quintuplets which are named gold, silver, copper, zinc, and lead are the things which are nearest and dearest to the hearts of the

metal miner. Montana, due to the enhancement in the price of gold, has seen a marked reawakening in gold mining, both lode and placer. It is, significant, however, that so far as lode mining is concerned no new deposits have been discovered but that the activity in gold mining has been largely a matter of the reopening and the reworking of districts which were productive in the 90's and the 1900's. Numerous instances of this will occur to the minds of all of you. The inevitable inference therefore is that in all probability the major deposits of the precious and semi-precious metals of the state which crop out at the surface in any conspicuous manner have been discovered and worked to greater or less extent; that is, they are "known lodes" in the sense of the mining law.

Does this mean, then, that our future operations are to be limited to known outcrops or to blind veins which may accidentally be found in the course of the development of known lodes? Definitely, I think this is a false assumption and I say this for two reasons: In the first place, that which we think of as perhaps the most permanent thing we know, namely the crust of the earth on which we live and move and have our being is, when viewed geologically, a most transitory thing. That which was the surface 10,000,000 years ago is not the surface today and will not be the surface 10,000,000 years hence, and 10,000,000 years is only a second when measured by the hands of the geologic clock.

Surface Outcrops Transitory

Since, therefore, the surface is a transitory and a more or less accidental, warped surface, that intersection—which we call an outcrop—between the surface and the vertical dimension of a more or less tabular vein standing at a high angle is manifestly a geological accident. Thus, except for that type of metalliferous vein which is a near-surface phenomenon, there is no particular reason to suppose that if the surface in a metalliferous region were a thousand feet higher than it is now or a thousand feet lower than it is now, the number of outcrops would be notably greater or less than it is at the surface as we know it in metalliferous regions today. I am speaking, of course, of veins which show a definite depth-persistence. It follows, therefore, if I am correct in this analysis, that there are probably almost as many blind veins

TABLE I—APPROXIMATE TOTAL MINERAL PRODUCTION OF MONTANA, 1862-1938, INCLUSIVE

Compiled by Montana Bureau of Mines and Geology

Product	Quantity	Value
Metals:		
Gold	1862-1938 15,891,155 fine ozs.	\$340,643,637
Silver	1869-1938 679,270,194 fine ozs.	497,366,762
Copper	1862-1938 11,369,866,000 lbs.	1,671,166,500
Zinc	1905-1938 3,100,864,000 lbs.	235,110,848
Lead	1882-1938 1,131,130,000 lbs.	60,066,288
Manganese ore	1916-1938 956,000 tons	22,944,000
Total, major metals		\$2,827,698,035
Nonmetals:		
Coal	1880-1938 117,357,794 tons	\$239,952,700
Petroleum	1915-1938 70,490,000 bbls.	91,493,320
Natural gas	1915-1938 184,416,506 M cu. ft.	40,000,000
Gems	1915-1927	2,790,899
Sand and gravel	1906-1938 38,645,000 short tons	10,477,000
Stone	1888-1938	10,500,000
Clay products	1894-1938	15,000,000
Total, nonmetals		\$410,213,919
Miscellaneous *		\$70,000,000
GRAND TOTAL, 1862-1938		\$3,307,911,954

In 1937 the state produced 289,056,000 pounds of copper with a value of \$34,975,776; 35,914,000 pounds of lead, valued at \$2,118,926; 78,336,000 pounds of zinc, valued at \$5,091,840; 202,252 fine ounces of gold, valued at \$7,078,820; and 11,812,093 fine ounces of silver, valued at \$9,136,654. The total value for these five metals was \$58,402,016.

* Approximate. Includes the minor metals: cadmium, tungsten, antimony, iron ore, ferro-alloys, and molybdenum; and the nonmetals: arsenious oxide, asbestos, cement, coal tar, carbon black, corundum, flint, graphite, grindstones, gypsum, mineral water, phosphate rock, sulphuric acid, and quartz.

yet to be discovered as of outcropping veins which have been discovered to date.

Considerations On Origin

All this, of course, is true only of areas in which the conditions for the deposition of ore are favorable. Do we know what these conditions are? I think we do. It has been established almost beyond the peradventure of a doubt, that all ore deposits of the type we are discussing are, with here and there a possible exception, deposited in one way and in one way only—namely, by the uprising through greater or smaller fissures of the juices given off by granitic magmas. Thus we must have a host rock with fissures in it, and we must have had nearby ore underneath granitic magmas to supply the mineralizing juices as the process of metallization proceeds. Apparently, high spot or "cupolas" in the surface of the magma are especially favorable places for the congregation of these juices. These high spots, if they reach the surface, exhibit themselves as small granitic areas and also in larger outcrops which are the upper surfaces of what we refer to as batholiths.

We have at Montana School of Mines a relief model of the entire state on which the various geologic formations are painted in different colors. Granite, in accordance with the usual

custom, is colored red. As I look at the relief map, I see two large red areas. One is that portion of the Idaho batholith which extends into Montana. This lies mainly in Mineral, Missoula, Ravalli, and Beaverhead Counties with an outlier extending up into Granite and Deer Lodge Counties—the Philipsburg batholith. The second large red area touches Beaverhead, Silver Bow, Jefferson, Deer Lodge, Powell, and Lewis and Clark Counties with a sizeable granitic outlier in the Tobacco



Dr. Thomson believes there are almost as many blind veins yet to be discovered as of outcropping veins already found

Root Mountains in Madison County. This is the Boulder batholith, and about the Boulder batholith, and always in the vicinity of mountain uplifts, are other little red spots extending as far eastward as the Moccasins and the Little Rockies. All of these red spots on the map are in general areas in which or near which metalliferous deposits of greater or less significance should occur and do occur. Thus, the favorable conditions for the occurrence of ore bodies exist in Montana, in numerous places.

Constantly keeping in mind that outcrops are accidental occurrences and that favorable loci are numerous throughout the state, particularly in the western third of it, there is every reason to suppose that further significant discoveries of gold, silver, copper, zinc, and lead will be made as soon as we have the tools and the knowledge with which to make them, or with which to predict the places where they should be sought for with the drill or by geophysical prospecting or by other aids which will undoubtedly be discovered.

TABLE II—DISTRIBUTION OF MINERAL PRODUCTION OF MONTANA
1862-1838

The production of 3 1/3 billion dollars is important, but unthinking persons might and will reply that the state has been "robbed" of its mineral wealth to just that extent. In fact such "thinking," if it can be so characterized, is rather popular in certain "left-wing" circles at the present moment. In the words of the bappy warrior, "let us look at the record." In round numbers here are the figures:

Production	\$3,300,000,000
Dividends and net profits (est.)	500,000,000
Operating cost	\$2,800,000,000
Allowance for expenditure in non-productive enterprises and for profits and undeclared dividends re-invested in plant and development ..	200,000,000

Total net expenditure by industry

What then became of this \$3,000,000,000? It was spent for just five items: wages, supplies, power, freight and treatment, and taxes. Taking these items and allocating to each its average percentage over the period covered, we get for the distribution of the \$3,000,000,000:

Wages, 60 percent	\$1,800,000,000
Supplies, 17 percent	510,000,000
Power, 9 percent	270,000,000
Freight and treatment, 9 percent	270,000,000
Taxes, 5 percent	150,000,000

Total

Practically all of this money was spent within the state.



Further improvements in concentrating techniques will doubtless aid in prolonging the useful life of Montana's mineral reserves

Chromite Resources

This inadequate review of the situation would be still more inadequate if it failed to mention one of Montana's most important and, as yet, largely undeveloped metalliferous resources—namely, the chromite deposits of Sweetgrass, Stillwater and Carbon Counties. This chromite "belt" can be traced for more than 20 miles along the surface and is exposed vertically over a range of 2,000 feet or more. Montana chromite is at present largely undeveloped by reason of competition from foreign sources, but 24 hours after we became engaged in war, this resource would receive immediate attention. Let us hope that we will be wise enough and enterprising enough to develop it without the terrible holocaust of war. Manganese is another significant war-mineral resource which has a future as well as a past. So much then for the future of the industry.

For a few moments let us take a look at the significance of the mineral industry to the economy of the state as it exists at present and as it has existed for the past 77 years.

Mining Industry As Consumer

But food stuffs are not the only materials which a mining camp consumes. Mr. William Stussy, of the Montana Power Company, tells me that the average consumption of the mineral industry of the state is 200,000 kilowatts and that the connected load is nearly half a million kilowatts. The consumption of timber and of lumber by the mineral industry is far

TABLE III—STATE AND LOCAL TAXES PAID OR ACCRUED BY THE MINERAL INDUSTRY OF MONTANA—FIGURES ARE FOR FISCAL YEAR ENDING JUNE 30, 1938

I. License Tax:		
Metal mines	\$415,512	
Coal mines	144,774	
Oil production	125,596	
Natural gas	58,722	
Cement	21,255	
		\$765,859
II. Net Proceeds Tax:		
Metal, coal, oil, and gas (approx.)		1,150,000
III. Corporation License Tax:		
Mining, milling, smelting	58,728	
Cement, lime, concrete, etc.	14,391	
Oil and gas, pipe lines, refineries	24,674	
		97,793
IV. Property Tax:		
Mining claims, mining machinery, mills and reduction works, mining railroads and trucks, and oil refineries (estimated) ..		850,000
		\$2,863,652

Items I and III are from eighth biennial report of Montana State Board of Equalization. Item II is derived from this report with approximation of millage levy for sundry counties.

Item IV is an estimate.

In state taxes alone the mineral industry pays directly over \$1,000,000 a year, or 25 percent more than the total appropriation for maintenance of all university units.

If we add the tax on electric energy used in mining operations, on timber and other subsidiary but essential supplies and services to the mineral industry, the total will be between 3 and 3 1/2 million dollars.

The above figures have been submitted to and approved as substantially correct by Mr. Milligan, auditor, Montana State Board of Equalization.

TABLE IV—BUTTE'S CONSUMPTION FOR YEAR 1938

Fruits, vegetables, and berries:	
Union Pacific Railway.....	728 carloads
Northern Pacific Railway....	129 "
Milwaukee and trucks.....	64 "
Total.....	921 carloads
Butter:	
All sources—50 carloads of 50,000 pounds, 2,500,000 pounds.	
Eggs:	
All sources—28 carloads of 30,000 pounds, 6,048,000 eggs.	
Cheese:	
All sources—11 carloads of 60,000 pounds, 660,000 pounds.	
Meat and poultry:	
Approximately 100 carloads of 50,000 pounds, 5,000,000 pounds.	

What would it mean to the state of Montana if it had two or three more communities like Butte? Add to this the consumption of Anaconda of that part of Great Falls and Helena maintained by mining and metallurgical operations and of all the little camps and towns scattered throughout our metal mining and coal mining regions, our oil fields and gas fields. Take the mineral industry out of Montana and it would be like a child's balloon to which some one has touched a lighted cigarette.

These data are furnished through the courtesy of Mr. Willard S. Thompson, Manager of the Butte Chamber of Commerce.

and away greater than any other industry in the state, and it is a certainty that 50 percent of the railroad tonnage and more than that of the railroad revenue comes from the transportation of mineral products of one kind and another.

Persons Directly Dependent on the Industry

In the matter of employment, the 1930 census shows 15,000 persons directly employed in the mineral industry in Montana, and if we take into account the entire population of Butte, Anaconda, and numerous small towns directly dependent on coal and metal mining and the oil and gas industries together and that part of Great Falls dependent on the reduction works and the oil and gas industry, the total number of persons directly and indirectly dependent on the mineral industry must be 150,000 or more, over one-fourth of the entire population of the state, and it is, of course, obvious that the mineral industry pays better wages than any other industry in the state.

Speaking of the mineral industry in its historical aspect, at one of the planning meetings several years ago, I remarked that "without the mineral industry mankind would still be plowing the ground with a sharp stick, reaping his grain with a cradle, thrashing it with a wooden flail, wearing a breechcloth, and living in a skin teepee." Insofar as Montana is concerned, without the mineral industry our Treasure State would still be the land "where the buffalo roam," with nothing to break the stillness of a vast undeveloped wilderness but the occasional warwhoop of the Indian and the far-off cry of the coyote.

that are chemically injurious to hose if permitted to remain on it.

3. Do not permit hose to remain on apparatus for any great length of time when not used. It should be removed, hung up in towers or on racks, and replaced with a fresh supply. Avoid short bends in hose that is stored away. When necessary to store hose in folds, the folds should be changed occasionally to overcome permanent set in the rubber lining.

4. Unless hose is likely to encounter a freezing temperature it is not necessary to drain the water out perfectly, as the rubber lining isn't injured by dampness within. On the contrary, hose is benefited by remaining in a moist condition. All rubber lined hose should have water passed through it at frequent intervals to moisten the rubber.

5. Hose when frozen is liable to crack, if bent while in that condition. Extreme cold causes deterioration of rubber, but not sufficient to prevent storage of hose in cold hose houses, if thoroughly drained and dried.

6. Avoid exposure of hose to very hot, dry air. It should not be stored where exposed to the sun's rays. When hose must be kept in hot, dry places, it is best to pass water through it monthly.

7. When fire hose is being used, see that section nearest engine or hydrant is not being chafed at point of contact with the ground by vibration.

8. Acids and other chemicals, oils, iron rust, etc., fumes arising from some processes are injurious to hose, and contact with them is to be avoided.

9. When discharging or recharging chemical engines or extinguishers, see that solutions used do not come in contact with the hose.

10. Be careful that the gasoline tank in your motor car is perfectly tight against drip and vapor. A small moisture deposition of gasoline leakage acid separates the rubber from the fabric of fire hose and produces subsequent failure when placed in service.

11. Before returning the hose to apparatus or reel, see that the sections (or line of hose) are not twisted. Each section should be laid out straight and perfectly flat on the floor or ground and carefully examined. If not twisted, the sections or line of hose will collapse naturally in a flattened condition—if twisted, the irregularities in form of "lumpiness" will be observed or quickly detected when folding the hose on the apparatus or when applying to the reel.

CARE of FIRE HOSE

By MICHAEL BERMAN

Technical Superintendent
Hewitt Rubber Corporation

INDUSTRIAL plants, as well as municipal fire departments, must give their fire hose expert systematic care in order to get the most out of their purchases. These suggestions, born out of Hewitt's 80 years' experience in the manufacture and sale of fire hose worked out primarily for municipal fire departments, should be of value to maintenance men employing this all-necessary item in or about their plants.

1. When new hose is received do not allow it to remain packed in cases un-

til it may be required. Remove from cases and loosen the coils.

2. Do not allow hose to remain in trucks or on reels if wet or muddy. Remove all mud by washing or brushing with a coarse broom and expose to air, in towers or on racks, preferably at full length, to dry.

Hose that is antiseptically treated will not mildew or rot if given ordinary care, but continual dampness is injurious to cotton fabrics. Mud often contains metallic or other substances

Explosives In Safe Keeping

MANY USERS of explosives do not fully realize the importance of proper storage facilities, a subject that deserves more careful attention than it usually receives. Dynamite and blasting caps, like other potentially dangerous products should, of course, be stored safely. Eminently practical considerations dictate that they should also be stored suitably to render dependable service. Field observations lead me to believe that existing practices in both respects can be and should be improved.

To insure safety to the public and satisfactory service to purchasers, certain common-sense rules should be followed. Suitable storage is not a question of individual opinion; instead, it is based upon the characteristics of explosives and definite requirements which have been standardized through years of experience. We know that buildings for this purpose must be protected from moisture, the weather, fire, excessive heat, theft and entry by unauthorized persons.

Explosives stored in damp underground locations, left on damp ground or in the open air, unprotected from the elements, cannot be expected to give the most satisfactory results in service, and they may cause misfires. Storing or keeping explosives in dwellings, offices, barns, outhouses, boiler rooms, blacksmith and carpenter shops, oil or tool houses, or wherever children or unauthorized persons may have access to them, violates the dictates of safety and of common sense.

Selecting the Site

Assuming it is necessary to establish a storage magazine, the first problem is to select a suitable site where, in the event of an explosion, there will be no resulting injuries to persons or damage to buildings and other property in the vicinity. Anyone who contemplates building a storage magazine should acquaint himself with state or local regulations, and he will also do well to study the requirements of the American Table of Distances, which specifies how far away from inhabited buildings, public railways and highways a properly barricaded magazine containing a given quantity of explosives should be located for safety.

• What Consumers Should Do to Reduce Risks and Get Full Value For Their Money

By C. H. FISHER

Manager
Storage & Delivery Section
E. I. du Pont de Nemours & Co., Inc.

Where barricade protection does not exist, the distances indicated in the table should be doubled.

The barricade, whether natural or artificial, should be of such height that a straight line drawn from the top of any side wall of the magazine to any point of an inhabited building, or to any point twelve feet above the center of a railroad or highway to be protected, will pass through an intervening barricade. An efficient artificial barricade is a mound of earth at least three feet thick.

In building these structures it is important not to use stone, gravel or other materials that might become missiles, in the event of an explosion. There should also be sufficient space—preferably about three feet—between the magazine and barricade, to provide proper ventilation and room for cleaning out dead leaves, grass and other debris accumulations.

Sometimes one cannot provide sufficient storage in one magazine and at the same time comply with the Table of Distances or with state laws. In that event, two or more magazines should be erected and reduced amounts of explosives stored in them, thus conforming to the general or local requirements. Where two or more magazines (except those built to contain blasting caps or electric blasting caps) are located on the same property, it is required that they shall be separated from each other by at least 200 feet, if the magazines contain 5,000 to 25,000 pounds of explosives. If more than 25,000 pounds are to be kept in each unit, the distance between the magazines should be increased by two and two-thirds feet for each additional 1,000 pounds. However, if the magazines are effectively barricaded from each other, the distance between them may be reduced one-half. Storage buildings for blasting supplies should

not be located nearer to any other magazine than 100 feet.

Accessibility, proximity to points of consumption and operating costs are important in selecting a magazine site, but considerations of safety should always outweigh those of convenience.

Type of Construction

Having decided upon a safe and suitable location, the next question to consider is the type of material to be used in constructing the building. Magazines may be described in three classes—brick, sand-filled, and fabricated metal. Those of the last-named type are frequently referred to as "portables."

If the storage is of a permanent nature, brick magazines will usually prove over a long period of years to be most economical, because of their low maintenance costs. High initial expense for construction, however, makes it expedient to erect sand-filled magazines in some localities. And if fabricated metal buildings are used for the storage of high explosives, they should be bullet-proofed with brick or sand-filled walls.

The safety of a magazine depends in no small degree upon the materials used in the walls. Bricks should be medium soft, to insure as complete fragmentation as possible in the event of an explosion. Paving blocks, glazed or hard-burned bricks become dangerous missiles and fly much too far for safety. For the same reason crushed stone or gravel is unsuitable for filling the walls of a magazine. Sharp, coarse sand should be used.

Provide Adequate Ventilation

It is important to provide adequate ventilation in explosives magazines. In the foundation walls screened vents approximately six by six inches, spaced

not more than five feet apart, should be installed. The floor should stop two inches from the walls on all sides and the roof should be equipped with a 12-inch diameter ventilator for each 12 feet of length. If the magazine is ceiled—and this is desirable in many instances to reduce the temperature within the building—the ceiling should be constructed so as to leave a two-inch marginal space for ventilation between the woodwork and walls on all sides.

Unless required by state laws, no signs or markings should be painted on a storage magazine, for irresponsible persons consider them as targets. The property on which a magazine is built should be posted, but "No Trespass" signs should be attached to trees or posts in such a position that if someone did shoot at them, the bullet would not travel in the direction of the magazine.

Hints on Operation of Storage Magazine

Having considered storage facilities, it is in order to stress the point that those who handle and use explosives should make themselves thoroughly familiar with the safety rules issued by all explosives manufacturers. Only a competent and careful person should be in charge of a magazine; he alone should keep the keys and be held responsible for the observance of all necessary precautions for safety.

When opening cases of high explosives and blasting supplies, he should use only a wooden wedge and a

wooden, fiber or rubber mallet, and he should not do this work inside the magazine. He should remove the case to a safe place—not less than fifty feet from the magazine—and open it there. Serious accidents have been traced to infractions of this rule and to the use of improper tools.

Aside from safety considerations, too frequently explosives are handled by persons who have little appreciation of values. It is important from a dollars-and-cents viewpoint that a magazine keeper should not pile incoming fresh stock in front of similar supplies already on hand. The old stock should be used first. Each grade and size should have its place and be kept separately in orderly piles.

Magazines are seldom located adjacent to railroad sidings. As a result purchasers of carload quantities must haul the explosives for considerable distances. Men assigned to this work should be careful and competent, and they should work under the supervision of the magazine keeper.

The vehicle used for transportation should be in good mechanical condition and free from accumulations of surplus of grease and oil. The electrical system should be inspected daily as a safeguard against the possibility of short circuits. The vehicle should not be overloaded or loaded so that packages of explosives will fall off; nor should they be transported in a truck with a metal body unless the metal is covered with a non-sparking material.

One should never use an open flame or lantern when handling explosives.

If artificial light is necessary, he should use some type of electric lamp. Many serious accidents have resulted from infractions of this rule.

Storing Blasting Caps

Blasting caps and electric blasting caps should never be stored in the same magazine with other explosives and—let it be repeated for emphasis—these accessories should never be kept where children will have access to them. It is also an unsafe practice to store primed cartridges or to make primers in a magazine containing other explosives. To do so is to invite serious trouble.

For safety in handling and storing explosives it is, of course, essential to maintain good housekeeping both in and around the buildings. Floors should be kept clean, with no loose dynamite or blasting supplies exposed. All materials should be kept boxed, and in handling cases of explosives no one should be permitted to use bale hooks or other metal tools. The grounds in the vicinity of a magazine should also be kept free of any accumulations of dead grass, weeds, leaves and other debris as a safeguard against the hazard of fires.

While the foregoing precepts are by no means complete, perhaps by calling attention to some of the requisite conditions for safe storage and handling of explosives, consumers of these products may be induced to give more serious consideration to this subject, which is really a vitally important one.

Absenteeism Audit to Cut Losses

An organized effort to reduce sick absenteeism throughout the heavy industries, source of staggering "hidden" losses to management and labor alike, is being launched by Air Hygiene Foundation. The Foundation, with headquarters at Mellon Institute, Pittsburgh, is a national organization of manufacturing and mining concerns for the advancement of industrial hygiene.

A preliminary report, "Sick Absenteeism in Industry," has just been released to the 200 member companies as the first step in the undertaking. Dr. A. J. Lanza, Medical Committee chairman, points out in this report that "eight-plus days per male wage earner and 12-plus days per female worker per year is the average toll paid to disabling sickness and injury—a staggering total whether viewed from the point of health or of money loss and at least five times greater than the corresponding figure for industrial accidents."

There are three steps in the program. First, the preliminary report which has been completed and which attempts to picture the problem for management. Secondly, the keeping of records on sick absenteeism by the participating companies on prescribed forms. And, thirdly, the analysis of these records, which will be held strictly confidential. This analysis is expected to yield specific ways and means whereby the participating companies can cut down their number of lost workdays through sick absences.

Cooperating with the Foundation in the study are the U. S. Public Health Service and the American Association of Industrial Physicians and Surgeons. These organizations collaborated in working out the forms to be used in recording the lost time and will aid in the analysis.

The preliminary report points to the complexity of the subject and shows that age, occupation, income, sick benefit plans, and methods of tabulating absences all enter into the problem. The report adds:

"Many employers who have never analyzed their absenteeism record would receive a shock if they were to find how frequent are absences of more than a week's duration and how many days their employees lose by such absences." Records compiled by the U. S. Public Health Service for a group of companies showed that sickness and non-occupational injuries, resulting in more than seven days' incapacity, caused 96 absences among over 1,000 male workers.

Short-time disabilities lasting less than eight days are the greatest concern to industry, particularly those of one, two, and three days. These are caused mostly by colds and respiratory infections, gastro-intestinal upsets, and a variety of causes not clearly defined. The important factors among the ill-defined causes are mental and emotional instability. Further, some companies find that employees with poor health records also had poor safety records.

HARD-FACING for MODERNIZATION

By R. L. LERCH
Haynes Stellite Company

TO JUSTIFY the purchase of new equipment from which greater profits can be expected, through increased production and lowered overhead, it is necessary to know accurately what the new machine will cost; what it will do; the cost of operation; the overhead; and the production and profit it is hoped to realize from the investment. However, in this consideration of the investment, it is sometimes difficult to estimate accurately the important factors of depreciation and maintenance. The answer finally arrived at is usually that this new machine will pay for itself in 1 year or 5 years or 10 years, as the case may be, if it operates a given number of hours per day for so many days each year.

A new machine, no matter how efficient, represents a loss when it is standing idle. Loss of production due to shutdowns for repairs is an especially important problem with mines and mills which use modern machinery. This machinery is designed for high production. In the output of some new high-production units the loss of hours or even minutes means so much that, to justify their expense, these machines must be kept on the job day in and day out, with a minimum of time out for repairs and replacement of worn parts.

Heavy Abrasion in Mining

By the very nature of its operations, the mining industry is constantly faced with a factor of rapid depreciation—that of abrasion. At every step in the process, ore, coal, rock, or some other abrasive material is causing wear that will ultimately mean time out for maintenance or repairs. Steel or iron parts rubbing together also mean abrasion that rapidly wears away metal until its usefulness is impaired and replacement becomes necessary.

Here is where hard-facing, by helping to keep equipment continuously

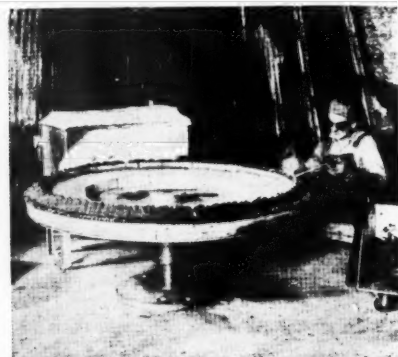
at work, plays an important part in any modernization program. Fortunately, most of the abrasive wear is localized to such an extent that the actual wearing surfaces can be protected by simply welding on a relatively thin layer of hard-facing material. Special alloys are used for this purpose. One, a nonferrous alloy of cobalt, chromium and tungsten, not only is hard at ordinary temperatures, but also retains its hardness at red heat. This latter property is of the utmost importance for high resistance to abrasion. Other hard-facing alloys possess great toughness or impact resistance, while still others are true diamond substitutes.

Depending on the type of hard-facing material used, these hard-facings outlast plain steel parts from 3 to 10 or more times. Because of longer life, fewer replacements are necessary, resulting in uninterrupted production and a general increase in operating efficiency. On an over-all average, idleness of machinery and labor during replacement are reduced to about 80 percent. Although most wearing parts are not hard-faced until they are worn in service, the process is best applied to new parts of equipment before their first use.

Only Welding Equipment Needed

As a modernization process, hard-facing requires practically no investment other than the welding outfit which is standard equipment at practically all mines. All that is necessary is a welding operator and a supply of hard-facing rods. For such a small investment, the economies derived from the use of the hard-facing process are often enormous. The following typical examples will serve to illustrate how progressive mines and mills are using the process:

In coal mines where the coal is reasonably free from boulders or "niggerheads," hard-faced cutting machine



Hard-facing a rack of cutter bits

bits are tremendously economical. Using just a drop of tungsten carbide diamond substitute on each bit has time after time shown an increase in bit life of 25 to 1 over steel bits. Power is saved, too, by the sharper bits, one mine finding that less than half as much current was needed, even when working in the hardest veins.

Crushers, either jaw or gyratory, can be kept more efficient by hard-facing. The tough, impact-resistant, iron-base hard-facing metals containing manganese and chromium have proved best on such applications, usually resulting in a life increase of 2 to 3 times at a fraction of the usual replacement cost.

Bucket lips, dragline scrapers, grizzlies, skip guides, sprockets, rabble disks and even conveyor belt clips are among the parts regularly hard-faced with excellent results. The list of parts hard-faced successfully could be extended almost indefinitely, as hard-facing can provide, at a low cost, exceptionally long life on practically all equipment subjected to severe abrasion.

Because of this, any factors of wear and abrasion which materially increase operating costs and reduce profits can be combated easily and effectively by the hard-facing process. This process is readily adapted to any modernization program. It means a greater return on investment by assuring more continuous production and operation of expensive equipment.



COAL

COMPANY PURCHASING

THE organization of a purchasing department for a bituminous coal mining company is similar to that of a great many other industrial organizations. To get the best results from such a department it should have sufficient authority to make its efforts worth while. As a matter of general policy the purchasing department should be the agency through which all contact with vendors is made where purchases or possible purchases are contemplated. It is important that the purchasing department be informed as to new projects to enable it to secure proposals for the interest of the operating officials of the company—not from one source but from a reasonable number of sources of supply of satisfactory equipment or materials. Early information on these matters will enable the properly organized purchasing department to give the operating officials all the information the market affords rather than that from only one source. Many instances can be cited where this method has resulted in substantial

● *Useful Hints In Operating This Vitally Important Department In Modern Mechanized Coal Mining*

savings—not only in first cost but in the final selection of more suitable equipment or materials. Oftentimes substitute materials or equipment may be found which are either lower in price or higher in quality.

Requests for information on equipment or materials should flow through the purchasing department, and it must be organized to handle such matters. This method is more efficient and economical; furthermore, it gives the operating official more time to devote himself to operating problems. It is obvious that if an operating official spends a good portion of his time interviewing sales people he is taken away from duties which are his direct responsibility. If such sales people are interviewed in the purchasing department the matters which are of interest to the operating official can be brought to his attention and the others weeded out.



By J. M. KNOWLES

Asst. Gen. Purchasing Agent
Consolidation Coal Co., Inc.

Department Must Be Adequately Staffed

It goes without saying that a purchasing department which has sufficient authority to do these things must be adequately supplied in personnel. In other words, it must be capable of understanding the problems of the operating official and of transmitting them intelligently and expeditiously to the vendor and from the vendor to the operating official. Nothing here is intended to infer that there shall not be contact between the vendor and the operating official. This is essential, as the purchasing man is not qualified to discuss operating problems.

In a coal company which has operations in several states or at some distance from the operating headquarters it will be necessary that some person at each operation be entrusted with the responsibility of making certain local purchases. In the beginning it should be understood that in the interests of economy these must be held to a minimum. In the purchase of certain items like mine props and timbers, procedure should be set up at the mine or in the division where some one person is responsible to the purchasing agent for such purchases. In the case of certain other emergency items the requirements can be handled by telephone or telegraph to the purchasing department or purchased locally if the material is available and the money value not large.

Standardization Reduces Price and Minimizes Inventory

All mining companies have certain standards on which they purchase their materials and supplies. These are well known to the operating official, and any contemplated departure from these standards or these makes of materials should be brought to the attention of the purchasing department at an early date to enable it to make other arrangements. Likewise, a steady flow of information from the purchasing man to the operating official of new materials coming on the market is very desirable. Certain of these items will not get farther than the purchasing department, but many of them should go for final decision to the operating official who is best qualified to know. Standardization of materials and supplies is important because it reduces price in increased volume and at the same time minimizes inventory.

The same thing is true in the purchase of equipment. Many companies have found it desirable to standardize on certain makes of mining equipment in several mines in one locality, and possibly use other mining equipment at mines located in another locality. The selection of such equipment should be based on conditions at the mine where it is intended to be used and at mines where it might be of use at a future date. While mining equipment produced by the various manufacturers is similar in a general way, it differs in detail; there is often a piece of equipment made by one manufacturer which fits the conditions at a particular mine better than that produced by others. It is important that all concerned keep informed as much as possible on these differences in equipment. The safest way for a purchasing department to do this is to keep the inquiry list on equipment fairly broad, giving the manufacturers every opportunity to present the advantages of their equipment; also to ascertain what they have in mind in development in the near future.

Equipment items are generally purchased on specific financial approval from the company directors, whereas supply items are handled in a more direct manner. However, both equipment and supply items should always be transmitted to the purchasing department on requisition, properly approved by those in authority, and it should be against the rules for requirements to come to the purchasing department by telephone or in any in-

direct manner unless same are promptly confirmed by requisition.

When an item appears on requisition in the purchasing department which is obviously the result of the visit of a salesman to one of the mines without prior contact through the authorized agency, this item should be examined and brought to the attention of the proper officials so that a decision can be made as to whether or not it should be purchased.

Joint Action In Purchasing Major Equipment Items

After an appropriation is made for a tippie or cleaning plant or locomotives, mining machines, loaders, etc., and bids are secured on all the available equipment which is applicable it becomes the duty of all concerned to make a decision. The decision primarily is one for the operating and engineering departments but jointly with the purchasing department. It has been said that the using department should specify what it wants and the purchasing department should specify from whom it should be purchased.

Where there is a sincere desire on the part of all concerned to work for the best interests of the company there should be no clash of opinion as to what should be purchased. Sometimes where there is an honest difference of opinion between departments or between officials in the same department a vote may be taken and a decision made on this basis. It is far

In purchasing major equipment items, decision is primarily for operating or engineering department, but jointly with the purchasing department



better to have a dissenting opinion at times than to have all in agreement on every purchase.

In making a selection there must be taken into consideration the nature of the equipment and its adaptability for the work it is to do, the design and construction of the equipment (and in this respect it must be kept in mind that mining equipment is sometimes subject to abuse), and the reliability of the concern building the equipment. Generally speaking, price should come after the other factors but not in every case. As all mining men know, good mining equipment has been designed and built in the past, but in a few instances has not had the backing of a strong manufacturer; therefore, production of such equipment has never gotten beyond small numbers and trouble has been experienced from a maintenance standpoint.

Purchases of equipment should not be made on friendship. The coal company official, in or out of the purchasing department, owes all his loyalty to his employer, and his recommendation on the purchase of equipment should be thoroughly unbiased and based on his knowledge of what he believes the equipment will do.

Care in Discussing Prices

In the purchase of equipment some purchasing departments submit manufacturers' specifications only to the engineer for his decision, retaining prices in their own possession. This is not felt to be good practice, however, as the engineer or production man is certainly entitled to know the price. In knowing price, however, he must have had sufficient training that he does not disclose it directly or indirectly. This point is made because many men—not alone in the operating department but in the purchasing department as well—disclose price or trend of price unwittingly in conversation with the salesman. They do this because the salesman, knowing conditions in his particular industry far better than the customer and knowing what has recently happened with relation to his price and his competitor's price in the immediate past, frequently secures price or other information, sometimes by word of mouth or merely from an attitude. In discussing the possible selection of equipment with the sales representative, the purchasing or operating official sometimes makes the mistake of asking a question about it in such a

way that in his own mind it has already been purchased. It is felt that the best way to handle the matter of price on equipment is to keep it in the purchasing department if at all possible, and to try not to be oversold on equipment before a decision is made. This is, in addition, a fair policy to the other bidders.

Sale of Obsolete Equipment

The sale of unused or obsolete mining equipment can be handled by the purchasing department with advantage to the company. A complete list of all the equipment available for sale should be made and the various items detailed as much as possible. These lists can be sent to the various dealers or to other coal companies where they

lowed in the disposal of scrap iron and metals. Generally the purchasing department is organized to handle the sale of these items in such a manner that a reasonable number of competing bids will be secured and the items sold to the best possible advantage to the company. Sales should be made on a weight basis. Lump sum bids are of a gambling nature and should be avoided.

Merchandise for Company Stores

The purchase of merchandise for the coal company stores follows along similar lines to the purchase of materials and supplies for the mining operations. Many coal companies are so organized that purchasing for the stores is in another department, but



Recommendation on purchase of equipment should be thoroughly unbiased and based on the operator's knowledge of what he believes the equipment will do

will get attention, particularly if the details are given. It pays to take the time necessary to get dimensions, capacity and condition of the equipment so that all may be incorporated in the list. If possible, the different pieces of equipment should be priced so that the dealer will have full information at his immediate command. The condition of the equipment should be represented clearly as, in any event, it will doubtless be inspected before purchase, and it should be found as represented in the list.

Sometimes it is difficult for the operating man to decide whether or not he wishes to offer a piece of equipment for sale, as conditions may change to the point where it might be wanted in the future. In that event, if the piece of equipment is included in the list and offered for sale subject to prior disposition, then, if and when an actual opportunity to dispose of it occurs, it is easier for all concerned to make a decision as to whether or not it should be retained.

The usual procedure should be fol-

lowed in the disposal of scrap iron and metals. Generally the purchasing department is organized to handle the sale of these items in such a manner that a reasonable number of competing bids will be secured and the items sold to the best possible advantage to the company. Sales should be made on a weight basis. Lump sum bids are of a gambling nature and should be avoided.

It is very important in purchasing merchandise that the buyers inform themselves as to what the market offers. Besides the staple lines which are carried in all coal company stores there are many special items to be considered, and the up to date buyer keeps informed so that his company may be able to offer its employees and others the advantage of timely purchases in the market. In the selection of these items the merchandise department itself should be the judge as to what should be purchased, as it is purely resale, and no one is as well qualified as the head of the merchandise department as to what will sell. It becomes then a matter for the purchasing department to purchase the

quality specified at the best price and delivery possible, keeping in mind standardization for inventory and volume purchase purposes.

Certain merchandise items are sold by the manufacturers on the basis of the price of the commodity on exchange. These are particularly flour and sugar. A knowledge of what the future holds on these commodities is invaluable to the purchasing department and probably the best way to secure this information is from the producer himself. Friendly relations should exist with the several producers of these commodities as they will prove invaluable at times in the making of future purchases. Speculation is not referred to, as speculation has no place in the purchasing department, but it is possible to make volume bookings or purchases on correct and timely information.

It will be advisable to contract annually for many requirements for the stores as well as for the mines, and it will also be found good practice to make use of standing orders for a great number of the products bought regularly for the stores. This will have the effect of reducing cost of handling in the purchasing department.

Protective Clauses in Order Form

No attempt has been made to get into the details of operation of a purchasing department, the various forms used, etc., as these matters are fairly well standardized, particularly in the larger companies. There are one or two things, however, to be noted—the first one of which is that the order form should carry certain protective clauses. One of these is the following:

"In accepting this order you agree to indemnify us against all losses, damages and expenses arising from liens and from infringements of patents, and also against loss, damages and expense arising from injuries to person and property caused in whole or in part by yourself, your agents or your employees while engaged in executing this order."

Adjustments for Defective Materials

Occasion will arise in the purchasing department when adjustments must be made with suppliers for defects in materials or in equipment. When such occasions arise the department should get a report as to the actual condition existing, and then with approval of the operating or engineering official involved, make an equitable adjustment with the vendor. Claims of defects should be honestly

presented and the opportunity should never be used as an occasion to unduly force a price. No vendor likes to make adjustments, but generally speaking, practically all concerns will do so when the matter is presented as early as possible and in a fair manner. It is obviously unwise for the buyer to force the last possible dollar in an adjustment if he is going to continue to do business with that vendor. At the same time the buyer should protect his company at all times and not be driven into an adjustment which is based on an unfair attitude on the part of the vendor.

The purchasing department is essentially a service department and it must be so organized that it is prepared to give the service required by the operating and merchandise departments at all times. The placing and follow-up of emergency orders is one yard stick of measuring the efficiency of the department; while emergency purchases should be held to a minimum, there must be expeditious handling when one occurs. A knowledge can be gained from sales representatives as to the stocks they carry and the location of these stocks. Another good point for the purchasing department to consider is a list of the home addresses of one or more officials in certain companies so that they may be contacted at night or over weekends when the need arises and fast handling is required.

Urges Best Possible Reception and Interview Arrangements

Since the purchasing department represents in a large measure the normal contacts of the company with its suppliers there should be suitable arrangements for the reception of the sales representatives of these concerns, and these men should be handled with a minimum amount of delay. The arrangements in some mining companies for seeing sales representatives are such that they are discouraging, to say the least. The method of reception and interview should be the very best possible, as it is out of such occasions that opportunities will arise in the future to make purchases of advantage to the company. The purchasing department should not shut itself off from sales representatives who call, and it is felt very inadvisable that minimum visiting hours be established. Salesmen must get in a full day's work to be of use to their companies, and if all buyers limited the hours in which they would see salesmen the cost of selling (which is in

the price of the product) would undoubtedly advance.

There is another practice existing in some purchasing departments which might well be eliminated. That is the custom of the buyer leaving his office and seeing the sales representative in a public reception room and asking the sales representative what his business is at that time. The sales representative is at considerable disadvantage, especially in the presence of other salesmen whom he does not know. He cannot be expected to say anything of value since he might be talking in the presence of a competitor or the friend of a competitor. If it is necessary to see the sales representative outside the buyer's own office, then the discussion should take place out of hearing of other sales people. The best practice is to see the salesman in the buyer's office if it is at all possible; if not, some arrangement should be made to give that salesman the same opportunity that the buyer would like to see his employer's salesman get in making his calls.

Contracting for Construction and Repair Work

In projects involving new construction or repairs to existing structures the purchasing department should cover such projects with a contract to be awarded to the lowest responsible bidder who meets the specifications prepared by the engineering or construction department. The contract may be of the firm bid type, the unit price type or on a cost plus basis. The firm bid type of contract is familiar to all, so no time need be spent on that. The unit price contract is one where the project is split up into a number of different classes of work and a unit price put on each class. For instance, there may be a price per cubic yard for excavation and a price per cubic yard for concrete or a price per lineal foot for sinking a shaft or driving a tunnel. This type of contract has its advantages since the contractor is able to closely figure his cost on a unit basis, and the buyer pays for the total number of units of work installed. This takes considerable estimating hazard out of the job for the contractor; therefore, there is no incentive for him to arbitrarily increase his bid in contemplation of possible unseen difficulties in the work.

There is rarely a need for a cost plus contract to be made. Many contractors will not agree with this statement, and naturally they cannot be expected to do so. Under this type of contract

they take no chance whatever as they are at all times working on a marginal basis. The more expensive the work the more their return, and contractors have admitted that in certain instances they do not let their field forces know they are working on a cost plus basis if it can be avoided since there is a tendency on the part of some employees to slow up on the cost plus project. Where the work is of a difficult nature to estimate, it is generally possible to break down the bid to the unit price basis which should be more equitable to both parties.

Protection Against Accidents, Fire and Other Damage

The purchasing department must protect the company in such contracts with regard to liability in the event of accident or damage to property. Generally speaking, it should insist on the contractor showing actual evidence of carrying workmen's compensation, public liability and property damage insurance, and in some cases the company should carry contingent liability insurance. The purchasing department should also incorporate in its contract an understanding as to who pays the taxes which may be levied on the project. Taxes are generally an obligation of the company, but the contract should clearly include these items so that no misunderstanding will occur when the job is completed as to whether or not taxes were included in the bid. In some states income taxes must be paid by the contractor and the contractor's employees on construction work done by out-of-state contractors, and the contract should cover this as the company is liable in some cases where the other parties do not take care of their obligations.

During construction work there arise certain designated risks such as fire or other perils to the new work, as well as to the property and equipment of the contractor while it is located on the premises of the company. This should be handled in accordance with the general understanding between the two parties—namely, that the contractor will assume all such risk or will insist on the company adequately covering such property and equipment and paying the insurance premiums thereon.

Attention should be paid to the subletting of any part of the work under a general contract. This is a common practice, as contractors find it more economical to sublet certain parts of a large contract. In this event the purchasing department should be in a



Standardization of materials and supplies is important because it reduces price in increased volume and at the same time minimizes inventory

position to refuse to permit the subletting of any portion of the work if it is desirable or if the suggested sub-contractor is not considered reliable. If the services of a sub-contractor are permitted to be employed, the general contractor should show evidence that the sub-contractor is properly protected in the event of accident so that no liability will be attached to the company.

It should be noted at this point that the standard public liability and property damage policies only cover the specified or legal liability imposed upon the contractor by law, and do not cover any additional liability which may have been assumed by him. In other words, a contractor might assume certain liability in a given contract which is not covered in the standard public liability and property damage policies he would furnish. In this event it is possible for the contractor to get from his insurance carrier a rider for the coverage under which the insurer assumes all the liabilities which the contractor has assumed in his agreement with the company.

Another important provision in construction contracts is one to the effect that all the equipment and machinery furnished by the contractor shall be in safe and satisfactory working condition. This is not only a safety feature but one which will tend to facilitate the progress of the work.

It is generally understood that in some states if the contractor is an individual and does all the work or performs the services himself, or if the contractor is a partnership and the partners do all the work or perform the services themselves, that workmen's compensation insurance is not

required. The validity of this would be open to question if the partnership was formed on the spot to escape buying workmen's compensation insurance.

Where contracts are made for repair jobs, service work or small construction jobs it is often the case that the low bidder does not carry public liability and property damage coverage. If it is still desired to go ahead with this bidder the purchasing department can prepare a so-called independent contractor agreement in which the company can elect to make no request for evidence of insurance coverage of any kind. However, to be protected legally the company must waive all right to supervise, control or direct the work in any manner, thereby making the other party an independent contractor. A job done under this plan is theoretically lower in price since it presumably includes no insurance costs, but the entire agreement may be nullified if at some time subsequent to the execution of the contract or agreement a supervisor or agent of the company issues orders, verbal or otherwise, to the independent contractor to do the work or a part thereof in a certain manner, and an accident ensues. In this event the independent contractor loses his status as such and becomes in effect an agent of the company.

Summing this up, it is felt that the independent contractor type of agreement or contract has its use in the smaller jobs, but in large construction contracts it is felt that adequate insurance protection should be specified in the contract. When the policies are submitted to the company they should be carefully checked to see that the company's interests are properly protected.

The Matter of Reciprocity

One feature of purchasing which has grown in recent years is that of reciprocity. This is a delicate subject, and it is felt all purchasing men will agree that if reciprocity could be eliminated so much the better. It is, however, quite apparent that it cannot be eliminated; therefore, it demands serious consideration in all cases where it arises. It is undoubtedly best handled when it is fairly and honestly handled. It is much better practice if the number of officials handling reciprocal matters is reduced to the smallest possible number so that there will be no working at cross purposes. It is also felt that promises to be fulfilled in the future should not often be made, since conditions change rapidly and friction may be developed. Reciprocity has proved its value in some cases where materials purchased for the first time from a customer have proved to be superior to those displaced. Generally speaking, indirect or three-way reciprocity is felt to be of minimum value.

Urges Comprehensive Annual Report

The purchasing department should be required to make an annual report of its activities. This report can be



made into a very comprehensive record of what has happened during the year; if properly prepared it should serve as an excellent yard stick of the efficiency of the department. With regard to measuring departmental efficiency, some concerns put this on a cost per dollar basis—that is, they divide the total cost of operating the department by the dollar volume purchased. In industry, generally, this will run from 1/2 percent to 2 per-

cent, but it is not a good yard stick principally because if a purchasing department pays too much money for what it buys it has the effect of reducing the cost per dollar. Probably the best way to measure efficiency is by the study of a well designed annual report of the department; also by comparison with results obtained by another purchasing department in a company with similar purchase volume.

Clarification of Coal Washery Water

Over 50,000,000 tons of bituminous coal are cleaned annually in the United States by wet methods. The recovery of the water, fine coal, and impurities from the water used for washing is ordinarily carried out by means of various forms of settling tanks. Settling and clarification may be hastened markedly, thereby greatly increasing the capacity of clarification equipment already installed, by the addition of substances to the washery water which cause the fine particles in suspension to agglomerate and thus settle more rapidly. The results of an investigation showing the effectiveness of various substances for clarifying coal-washery water is given in a report just issued by the Bureau of Mines, United States Department of the Interior.

Starchy materials such as potato starch, wheat flour, and cornmeal were found to be effective flocculants of coal, but they usually show a short range of reagent concentration in which they possess the maximum of effectiveness. At high concentrations these colloidal materials cause stabilization of the suspension. Electro-

lytes are also effective flocculants, but the concentration necessary to produce good flocculation is much higher than with the starchy materials. For flocculating shale, however, electrolytes are more effective than starches, but some of the electrolytes might be objectionable in actual use. A combination of electrolyte and starchy colloid is advantageous because the combination is an effective flocculant at low concentrations and because no stabilization occurs at higher concentrations.

Another important aspect of flocculation of coal-washery water is the effect on dewatering slurry by filtration. Flocculated coal slurries filter much faster than unflocculated ones, but the concentration of the flocculating agent has to be controlled, as too high concentrations result in a decreased rate of filtration.

This investigation, carried out at the Northwest Experiment Station of the Bureau of Mines, in cooperation with the College of Mines of the University of Washington, is published as Report of Investigations 3494, entitled "Flocculation as an Aid in the Clarification of Coal Washery Water." Copies of the report may be obtained free of charge from the Section of Publication, Bureau of Mines, Washington, D. C.

Vinegar Hill and Century Sell Tri-State Holdings

Purchase of the operating holdings of the Vinegar Hill Zinc Company and the Century Zinc Company in the Tri-State mining district by F. S. Elfried, Jr., has been announced. Mr. Elfried is now associated with the Western Cartridge Co., and was formerly president of the Evans-Walloway Zinc Co., at East St. Louis, Ill. The holdings were purchased outright, and will be operated as the Jane E. Mining Co.

Properties of the two companies include a 60-acre lease in Kansas, north of Picher, where the famous Barr mill and mines are located. The Barr mines, first opened in 1918, have been operated almost continuously for more than 20 years, and have been one of the largest producers of zinc and lead concentrates in the field during that period.

The Century Zinc Company property acquired includes a 160-acre lease on the Scott land, a half-mile east of Hockerville, containing a large concentration plant and several mines. The transaction also includes the office building occupied by the two companies in Baxter Springs.

Determining Cost Factors Affecting Mechanical Mining

MECCHANICAL mining means more than merely mechanical loading. It includes every type of machine, equipment and method that contributes to that desired goal of low cost. The cost of mechanical mining is affected by three major factors and many minor ones. Before analyzing these factors let us set up a small table of actual rated capacities of loading machines and the amount of coal they would or could load if they were loaded to capacity and were able to operate full for the entire 7 hour mining period.

Theoretical Maximum Capacity of Loading Machines

- 1 ton per minute 420 tons per 7-hour day (420 minutes)
- 2 tons per minute 840 tons per 7-hour day (420 minutes)
- 3 tons per minute 1,320 tons per 7-hour day (420 minutes)
- 5 tons per minute 2,100 tons per 7-hour day (420 minutes)

As a matter of fact, few machines realize more than 25 percent to 30 percent of their theoretical capacity in actual operation.

Let us analyze what cuts down the theoretical capacity of the machines so much. First of all, it must be noted that in order to realize the full theoretical capacity of the machine the gathering head must continuously be able to gather its full maximum capacity—that is, be literally buried in loose coal. This, of course, is an impossibility, as only during the period in which it attacks a fresh loose fall is this condition realized. As the rooms are partly loaded out, less and less coal becomes available for the gathering head; and when the final cleaning up process comes the head is only able to gather a small percentage of the coal the machine is able to carry. This, of course, is inevitable, but makes obvious the fact that the more loose coal available per fall, the longer time the machine can operate under ideal conditions.

● Assuming Proper Mine Layout, Major Improvements In Reducing Idle Machine Time Held to Lie In Bettering Service Haulage

By CLARENCE V. BECK
President
St. Louis Coal Co.

Conserving Machine Movement

The second limiting factor, of course, is moving the machine from place to place. This makes mine layout of prime importance. It is necessary to move the machine as little as possible. Any system which concentrates the work is desirable, and varies with natural conditions. In relatively thick seams (5 to 9 feet) such as we have in Illinois the standard panel system of operation has proved to be the best, as it concentrates the work. One fall of coal per face and one fall in the cross cut, which, if roof conditions are sufficiently good, enables one to work the checker board system (which means

staggered cross cuts at nearly room width), has proved to be the most desirable. If roof conditions are not sufficiently good for the checker board system, one has to be satisfied with one fall in the room and one in the widest cross cut that conditions will justify. This gives two falls of coal in each room which allows for the shortest movement of the machine: one move in each room to the face and one move to the cross cut; whereupon the machine is moved through a cross cut into the next room which seems to be about the maximum obtainable in conserving machine movement.

Mechanical loading has led to the use of longer cutter bars on cutting

Training of men and bosses is essential—not only is it necessary to have good operators, but the entire crew must be trained



Many are driving three entry stubs in order to be able to economically follow up the panel work with small inside partings.

Vital Role of Inside Haulage

The third and perhaps the most important thing in mechanizing mining is inside haulage. Keeping the machine served with empties is the heart of the entire problem. While many special systems for track layouts have been developed, the one that seems to be most universally in favor in room and pillar mines is to lay a track and switch in each cross cut following the machine up closely. This gives the opportunity for the empty pit cars to come through the cross cut from an adjoining room while the load is being hauled out to the parting and results in a quick and satisfactory car change. This, however, requires an excessive amount of track laying which is unavoidable and continual efforts on the part of the mine crew to keep the track up. It is a continuous fight. It also requires a great additional amount of track materials over hand loading methods. Inside track laying and inside haulage are the crux of mechanical loading.

Training of men and bosses is essential. Not only is it necessary to have good operators, but the whole crew must be trained.

Places must be prepared thoroughly in advance so when the machine crew goes in they have nothing to do but get coal. Maintenance of territories and machines must be kept up. To fall behind on any feature has disastrous effect on the machine tonnage and, hence, cost. Advance planning is necessary. You must stay on top of the job.

A full knowledge of daily labor costs is necessary for intelligent plan-

ST. LOUIS COAL CO. FLORIDA MINE DAILY OPERATING REPORT

TONS PRODUCED				Cost Related		Average Weight Cars		COST ON PARTING						SUMMARY			
Today		To Date		To- Day		To- Date		TODAY		TO DATE				Today		To Date	
								Hours		Amount		Per Ton					
Machine Unit #1																	
#2																	
#3																	
#4																	
#5																	
(A) Totals and Average All Machine Units																	
Conveyor Section #1																	
#2																	
#3																	
(B) Totals and Average All Conveyor Units																	
(C) Road Loading Section																	
(I) Totals and Average on Parting Mined Operation A & B & C																	
TODAY																	
TO DATE																	
Hours		Amount		Per Ton		Hours		Amount		Per Ton							
1 Total Parting Cost (1)																	
2 Main Haulage																	
3 Ventilation																	
4 Night Shifts																	
5 Misc. (7)																	
6 Bottom Hoisting																	
BOTTOM COST																	
7 Top Hoisting																	
8 Preparation																	
9 Yard																	
10 Power House																	
11 Shop and Maintenance																	
12 Supervision and Office																	
TOP COST																	
Total Production Cost																	
Washer																	
Retail Yard																	
Improvements																	
TOTAL LABOR COST																	
Washer Cost on Tons Washed																	
Retail Yard Cost on Tons Retail																	
TO DATE		TODAY		To Date		Hours		Shifts Hours		Tons Per Shift							
Machine Loaded Tonnage Total Time																	
Conveyor Loaded Tonnage Total Setup and Office Time																	
Haul Loaded Tonnage Total Sales Labor Time																	
Company Cost																	
Total Production																	
Tons Mined																	
Mine Cars Mined																	
Average Weight All Cars																	
Hours Worked																	
Men Working Today Top																	
Men Working Today Bottom																	
Total Men Working Today																	
Delays																	
Cars Mined Today																	
Temperature and Weather																	
Cars Loaded																	
Cars Mined																	
Cars to Local Yard																	
No Miles at Start																	
No Miles at Finish																	
Cars Oil Treated																	
Cars Washed																	
Tons Washed																	
LOCAL SALES																	
Tons Lump																	
Tons Furnace																	
Tons Small Egg																	
Tons No. 3																	
Tons No. 3																	
Tons No. 4																	
Tons No. 5																	
Tons Washed 1/2																	
Tons Washed #10																	
Tons from Storage																	
Total Local Sales (Tons)																	
Cash Sales (1)																	
Charge Sales																	
Train Sales																	
Pay Ball Sales																	
Total Local Sales (\$)																	
Collections (1)																	
Total Cash Receipts (1 & 2)																	
Local Measurements																	
Local Funds on Hand and in Bank																	
Total Pay Roll on Sales																	
Payroll/ton Sales																	
Pay Roll/ton Sales																	
REMARKS (Explain delays, work done on idle days, etc.)																	
Date																	

A full knowledge of daily labor costs is necessary for intelligent planning. Each boss and crew should be notified daily of their results

ning. Each boss and crew should be notified daily of their results.

While generally some part of the loading machine crew works at night, all night men are charged against the loading machine crew. While 250 tons per machine cannot be high, it is an average for this crew. Some are obtaining 300 or more tons with such a crew. Some operate a lighter crew for smaller tonnages. This, of course, varies with conditions. Larger tonnages are obtained by the use of larger machines and larger crews. However, where the larger tonnage machines are used, the larger crews prevent effecting as great saving as might be supposed. Large tonnage machines do not necessarily mean cheap costs. It might be stated that costs of coal delivered on the parting probably vary between 35c and 45c per ton in well operated

mechanical mines in Illinois, though tonnages of 200 tons to 600 tons per machine depending upon the type are being obtained.

Improving the "On the Parting" Cost

Now let us see how we can improve this cost. Most possibilities are in the "on the parting" cost. The first most obvious improvement would be from the substitution of an arc wall or slabbing machine for the standard short wall machine. This will enable one cutting machine to serve two loading machines and reduce the cutting cost one-half. Standard practice has been to operate one stub of a panel with two loading machines—one on each side. One arc wall or slabbing machine can easily serve both, and even then would not be loaded up. This

alone would cut costs 3 cents per ton.

Granting a proper mine lay-out and everything else being equal, the main improvement (saving of idle machine time) that can be made is in inside or gathering haulage. There are obviously only two directions in which to go; viz, the use of larger pit cars or to rubber tired or shuttle car inside haulage. Most mines are confined to their present type of pit cars; all are enlarging them in any way possible, and many are replacing their pit cars with the largest type possible—up to 10 tons. Shaft mines, however, are limited in the size pit car that can be used. Mechanical loading reduces the load that pit cars could formerly handle as the pit cars are loaded only level. It has been found that a five-ton car becomes only a little better than a three-ton car for mechanical loading, a

AVERAGE TOTAL COSTS OF PRODUCING COAL IN ILLINOIS AND INDIANA *

Cost per Ton, and Tons Produced each Method of Mining, April through December, 1937.	DISTRICT NO. 10 (Illinois)			DISTRICT NO. 11 (Indiana)		
	Per Ton	Tons Produced	Exhibit Number	Per Ton	Tons Produced	Exhibit Number
DEEP MINES						
Hand Loading	2.1793	6,887,696	C-188	1.9572	933,919	C-211
Mechanical Loading	1.7457	17,041,019	C-187	1.7636	4,655,765	C-210
TOTAL	1.8703	23,928,715	C-189	1.7962	5,589,684	C-212
STRIP MINES	1.4319	8,000,125	C-186	1.4631	5,038,391	C-209
TOTAL ALL MINES	1.7602	31,928,840	C-183	1.6384	10,628,075	C-207

* From data published by Bituminous Coal Division, U. S. Department of the Interior.

are done away with. In many mines it is found that one track layer per machine cannot keep up with it. This is especially true for large machines where more tonnage is produced. General labor is reduced after rub-

ber fact that the change is much quicker and the fact that the rubber tired unit can follow the loading machine.

Mechanization Vital in Illinois

Mechanization is moving ahead at a fast pace. Illinois is the most thoroughly mechanized state in the Union and in no place has mechanization been given more study. This is due, first, to the natural conditions within the state which are favorable to mechanical loading; and second, to the great pressure for lower costs made necessary by the fact that a large percentage of the production of the state is produced by the very cheap strip mining method. Cost figures published by the Bituminous Coal Division of the United States Department of the Interior are shown in the accompanying table. They include, of course, all mine, selling and overhead costs.

The shaft mines of the state are striving desperately to overcome this 31-cent advantage held by the strip mines. It is apparent that within another several years of further intensified mechanization, with consequent heavy additional capital expenditures, ultra modern mechanical shaft mine costs will overtake them, and probably "outstrip" the strippers.



Many operators are increasing machine capacity through the use of rubber tired haulage

ber tired "buggies," as they can follow the machines into corners. Most important, however, is that machine capacity is increased from one-third to one-half due to the fact that rubber tired units generally hold two to four times as much as the former pit car, the fact that there are no tracks or switches to interfere with the units (all track limitations disappear), the

three-ton car better than a two-ton car, etc. Some with small mine cars are loading "double headers," two cars at once.

Many are proposing to get away from mine car size limitations imposed by the hoisting shafts by using rubber-tired shuttle car haulage, which has other advantages. In the first place, all inside track laying and materials

ber tired "buggies," as they can follow the machines into corners. Most important, however, is that machine capacity is increased from one-third to one-half due to the fact that rubber tired units generally hold two to four times as much as the former pit car, the fact that there are no tracks or switches to interfere with the units (all track limitations disappear), the

Silver Dollar Deepens Shaft

Early in May the Silver Dollar Mining Company started work on sinking the main shaft at its property in the Coeur d'Alene, Idaho, district an additional 500 feet, from the 2,100 to 2,600-foot level. When completed, the new shaft will provide three new working levels in the mine, and will give a depth of 1,500 feet below the main tunnel level and 2,600 feet from the surface. Two shifts are being employed in the shaft work; the time of the third shift is being used in hoisting ore from the producing levels.

Smelter returns from Silver Dollar ore shipments have averaged about \$12,500 a month since last September, according to C. O. Dunlop, president of the company. It is planned to keep the present production going at the rate of 50 to 75 tons per day while the shaft is deepened. The bulk of the company's earnings have come from ore shipments made during the first four months of 1940. This was a direct result of the change from the earlier prospecting and development work to actual stoping operations. During April about 500 tons of ore was produced and milled, making

80 tons of concentrates which averaged better than \$250 per ton. Silver content was about 310 ounces, copper 9.5 percent, and about \$7 in gold values.

Many new improvements have been made at the mine in the past few months, including the cutting of double ore and waste pockets on the 1,900, 2,100, and tunnel levels. Hoisting capacity has been increased by replacing a 75 by a 125-horsepower electric motor, and a new automatic skip and cage of the latest design have been installed in the shaft.

a separate sheet. A unit time tabulation can then be made up; an example is Table I.

TABLE I

Observed Unit Times (Min.)				
0.67				
0.89				
0.91	0.96			
1.02	1.03			
1.10	1.10	1.14	1.15	1.18
1.48				
12.63 ÷ 12 = 1.052 Average				
Unit Times				
Avg.	Nor. Min.	Max.	Std.	
	0.90			
		1.48		
1.052	0.900	1.480		
1.052 Avg. + .900 Nor. Min. = 0.976				
	2			

Analysis of Summary Sheet

From Table I the normal minimum is selected as the average of the 0.89 and 0.91, 0.67 being obviously too low a value as compared with the others; ordinarily the normal minimum should be within 10 percent of the next higher unit time. Maximum unit time is merely the highest unit time recorded. For standard unit time, it is usually sufficient to take an average of average unit time and normal minimum unless the high or low observed unit times, or both, included in computing average unit time, vary too far from the norm. In this case, the extreme values should be thrown out and new average computed for the purpose of arriving at standard unit time. In Table I, throwing out the extreme high and low values would change standard unit time to .974 minute, a variation of only 0.2 percent.

Uses for Summaries

The uses to which summary sheets can be put include:

- (1) Setting of unit times based on a single study, as explained above.
- (2) Comparing studies of loaders engaged on the same type of work up to a total of three per summary sheet.

This is a check on loader performance which can be used to correct sub-standard operation.

(3) Setting of unit times based on two or three studies whereby the greater number of observations tends to level out inaccuracies and decrease the probable error.

(4) As a permanent file record of time study data, which data can be used variously to set standards for bonus payments, to estimate performance of machines in new types of work, to improve performance, and to indicate desirable changes in layout or procedure.

TIME STUDY SUMMARY SHEET																
OPERATION AND COMMENTS: Load coal with 1-shaft and 1-shaft room. Coal loaded directly into mine cars on track paralleling face. Time study held by hand coal supported by 1-beam 92' long perpendicular to face. Top cutting with 1-beam drilling with wire. See sketch for cut dimensions. 1-shaft room, 3.55 tons. Loader serviced by cable reel locomotive.										STUDY NO. 97		SUMMARY MADE BY: E.V.		NAME: #2		
										RELATED STUDY NO. 36, 38						
										DATE: 7-24-35 6 5 Mon. 6:58 2:28.5 29.00 421.50 134.8 (3A Cars)						
GENERAL SUBSUMES										UNIT TIMES						
NAME OF ELEMENT										UNIT TIMES						



The March of COAL MINING

Ten Years of Progress

DAILY COST STATEMENTS

for MECHANIZED MINING

By G. B. SOUTHWARD
Mechanization Engineer
American Mining Congress

THE daily and monthly cost statements as used by most coal companies have entirely separate purposes and functions. The monthly statement is primarily a resume of past events, and serves to establish the average cost and performance for the period, while the daily cost is an account of what is happening at the present time. The monthly sheet, designed as a report to the executives, is, to the men in the operating department, simply an official confirmation of what they already know (or fear), but the daily costs are of practicable help to the local management in keeping their production performances in line. The periodic statements, therefore, will be considered in this article as something for the auditing departments to worry over, and the following discussion will deal exclusively with the subject of daily records.

Mechanization and modern mining are bringing about changes in cost keeping, and as in the case of operating methods, the old ways have to be revised. With hand mining, it was not customary to prepare detailed performance records and cost analyses. Performances were pretty well established, and the local management depended largely upon personal observation and inspection to determine whether or not their operations were up to standard.

Importance of Daily Costs

Mechanization has changed this situation. In the first place, there are no standards to go by; and in the second place, coal companies have learned by experience over the past 10 years that personal observation cannot be depended upon to determine where economies can be made. Time studies have proved their effectiveness in coordinating the various elements of a group operation, and their use has become almost universally accepted as a necessity by mechanized companies.

Time studies, however, are necessarily applicable to only a portion of the mine operations, and there are many classes of work underground and on the surface where the cost figures are the only means of determining the performance efficiency. The daily cost statement, therefore, is becoming recognized as an instrument or tool which the local management must really use and not just look at.

It is becoming further recognized that the daily costs must be prepared with more accuracy than has been customary with hand mining, and it naturally follows that the time distribution must be carefully kept and correctly reported by the foreman. In this connection, it is well to remember that the average mine foreman is not a bookkeeper, and it is unfair to expect too much accuracy from him in filling out a complicated report form. Therefore, some companies entirely eliminate such reports, and, instead, have the foreman explain at the end of the shift, to some one who is competent to distribute the labor items, just how the members of his crew were employed. But no matter how the figures are obtained, they must be correct within a reasonable limit, or else the whole purpose of the daily cost will be defeated.

A cost statement should not be confused with an engineering analysis. An analysis is a complicated undertaking requiring careful study of numerous related factors, and because of the work involved it cannot be made

part of the regular daily procedure on each operating item. Special studies on any operating phase can always be made where and when needed, and most companies have found that a daily cost statement, which is designed with the idea of providing a complete detailed analytical record of the day's performances, will usually fail to accomplish any such result, and is apt to provide misleading information.

Cost Sheet Items

The items which a daily cost sheet should contain is a matter for each individual company to decide, and in this respect, there is quite a difference in practice and opinion. For example, a statement used by one company has more than 100 separate items of work classification, and also has six columns across the page to show the amount of labor, supplies, and total for each day and to date. This means that the daily sheet will have several hundred separate calculations.

On the other end of the scale, another company states: "We discontinued compiling exhaustive statements and instead predicated our estimates and operating performances almost entirely upon the production in tons per machine and average tons produced per man per day for all man-days worked. We discovered that if the productivity per man-day was correct, it would be reflected in our costs. In addition, so that we may know the cost of maintenance and supplies, we

Simplicity, therefore, in the design of the cost form and the reduction to a practicable minimum in the number of items shown, is the present trend in daily cost records for mechanized mines. It is the opinion of a number of companies, who have gone through the process of developing operating reports, that the figures on a daily sheet should be confined to costs and performances for which the operating officials are directly responsible. So-called "items of interest," fixed charges, standard daily costs, and a large number of more or less irrelevant items are apt to distract attention from the real issues, and have little value in the daily statement which goes to the mine operating official. Such items, if shown at all, should be in condensed form.

Cost of Non-Productive Time

The two principal ways in which the mine management can lower costs are by raising the performance efficiency and by eliminating waste—

wasted time, wasted effort, and wasted material. Unfortunately, a coal mine is dark, and for that reason many things occur which would not happen in a modern daylight factory. This makes the job of superintendence more difficult, and also emphasizes the need of designing the daily cost record so that it will reveal things which cannot be seen.

Chief among these unseen items is nonproductive time resulting from delays and other causes. We have long been accustomed to accept a certain amount of lost time as inevitable; this acceptance is governed more by our state of mind than by the actual physical facts; but in any event, little attempt has been made to see what these losses really amount to in dollars and cents. If we knew the actual cost of all delays, we might take a different attitude.

This being the case, should we not consider a delay as a separate cost item, since it actually consumes man-hours of employment in the same manner as the operations of loading, trackwork, etc. Then, since it would be entirely practicable for the mine foreman to show in his time sheet the actual man-hour time loss which occurred during a shift, why not set up these delay costs as a part of the regular daily cost sheet, somewhat as illustrated in the form shown below. If this were done, it is a safe assumption that some very revealing and perhaps disturbing figures would result. It is no doubt true that delays in each of the items shown in this form do not occur every day, but it is equally true that some lost time will occur in at least one of these operations, and when all are added up, their sum total might be sufficient to indicate a potential source for substantial reductions in the mining cost.

Consider briefly what is involved in each of these items. The cost of a machine breakdown during a shift, in addition to the actual time loss of its



The March of COAL MINING

crew, should also include any time spent by the mechanical force in making a temporary emergency repair. The cost of a haulage delay should include the cost of replacing or repairing track if the delay was caused by a wreck. The cost of power failures should, in reality, and as every electrician knows, include burnt-out armatures caused through low voltage. The cost of a roof fall should include retimbering when the fall is the result of inadequate timbering. So, if the real cost of a delay is to be set up, it should contain all the extra work necessary toward getting the operation under way again.

Supply Costs

The foregoing discussion on non-productive time is dealing primarily with the labor employed, but supplies and material should also be subject to close accounting. Different companies have different methods for charging supplies into their daily costs, but, as in the case of labor, the important thing is the accuracy of the figures. The main source of possible economy in the supply account is not so much in reducing the quantity legitimately used as in reducing the amount wasted. Waste occurs from several sources—failure to salvage material which can be recovered; excess material brought underground and subsequently overlooked or forgotten; and improper material which needs frequent replacement. The amount of this waste is, of course, debatable; that is, the exact figure is debatable, but all mining men know that it does add up to a substantial total, and a strict accounting for all supplies brought into the mine is being found to pay dividends.

[illegible]

Suggested form to show daily cost of delays



WHEELS of Government

WAR news from Europe bringing with it a strong national defense consciousness has caused rapid action by the Administration and the Congress in recent weeks. Successive defense messages have enormously increased appropriations for the army and navy as well as bringing a \$1,000,000,000 revenue bill and a proposed increase of \$4,000,000,000 in the authorization for the national debt. The date of adjournment for the Congress is now uncertain, for while it is known that the Administration wishes the adjournment as soon as the revenue bill is completed, there are many expressions from Senators and Representatives, as there were at the time of adjournment of the session last August, that Congress should remain in Washington to keep us out of war.

Of importance to the nation is the creation of the Council of National Defense with Edward R. Stettinius, Jr., Board Chairman U. S. Steel Corporation, in charge of raw materials; William S. Knudsen, President, General Motors Corporation, to supervise industrial manufacturing; Sydney Hillman on employment policies; Chester C. Davis, agricultural policies; Ralph Budd, Board Chairman Chicago, Burlington and Quincy Railroad, handling transportation; Leon Henderson, price stabilization, and Harriet Elliott, consumer protection. The Council members will devote their time to national defense work, with Mr. Stettinius and Mr. Knudsen handling the problem of guiding an expenditure of \$4,500,000,000 into equipment for the nation's defense.

Taxation

During the week of June 10 the House of Representatives is expected to pass the \$1,000,000,000 revenue bill of 1940 approved by the Committee on Ways and Means. In addition to a 10 percent supertax on all income revenue, the exemptions in the low brackets are to be dropped to \$800 for single and \$2,000 for married taxpayers. Corporation rates are up 1 per cent, and personal holding company taxes, excess profits taxes, capital stock taxes, estate and gift taxes, manufacturers' excise taxes and others are

● As Viewed by A. W. Dickinson of the American Mining Congress

affected. The gasoline tax is raised from 1 to 1½¢, cigarettes from \$3 to \$3.50 per thousand, distilled spirits from \$2.25 per gallon to \$3, and beer from \$5 to \$6 per barrel. There is much disapproval of this revenue bill as a hasty and slipshod action, and strong criticism is anticipated from the Senate Finance Committee, which is understood to believe in a more careful and thorough rewriting of the revenue law.

The Supreme Court has under consideration the case of the J. E. Riley Investment Company, which was denied the right to take percentage depletion on a gold mining property by the Ninth Circuit Court of Appeals December 26, 1939, because of failure to elect percentage depletion in a 1934 income tax return. The case is of real interest because of a favorable decision given by the Fourth Circuit Court of Appeals to the C. H. Mead Coal Company, August 28, 1939.

Guffey Act

On the night of June 6, Director Gray of the Bituminous Coal Division closed the hearings on minimum coal prices after taking testimony from a majority of the producers boards as well as from a large number of individual producers and representatives of consumers. It was argued by producers that the evidence which had been taken by the examiners in determining prices is insufficient to warrant price fixing. The Consumers' Counsel objected to the maze of differences in the announced prices, and argued that coal for domestic consumption should be no higher in price than coal for industrial consumption. Consumers' Counsel also urged seasonal discounts where coal can be stockpiled.

A recent Bituminous Coal Division order denied exemption from regulation under the Act to captive railroad and steel company coal production. In the case of the railroad company mines the order stated that no proof was given that the coal in question did not constitute or affect interstate

commerce. In the case of the steel captive Director Gray pointed as a "reasonable inference" that the arrangement between the steel company and its coal subsidiary was intended as a flexible contrivance by means of which the parent company hopes to establish itself as the nominal producer of the coal consumed by it and thereby escape the price provisions of the Act.

Through a bill introduced by Senators Wheeler of Montana and Schwartz of Wyoming, it is proposed to remove captive coal mine employees from coverage under the Railroad Retirement Act, transferring them to the jurisdiction of the Social Security Board. A ruling of the Interstate Commerce Commission sometime ago placing railroad coal mine employees under the Railroad Retirement Act has caused the managements of captive coal companies serious difficulty, but it is anticipated that the Wheeler-Schwartz bill upon which the Social Security Board, the Railroad Retirement Board, labor organizations, employees and employers are in full agreement will be quickly passed by both Houses of Congress.

The consistent opposition offered to the St. Lawrence Waterway and Power Project by the producers of coal and iron ore has apparently checked the Federal crusade for this costly venture. On June 1, an office in the Department of Commerce which had been created for the purpose of studying the economics of the St. Lawrence Project was disbanded, and it is understood that the entire matter will be held in abeyance.

Federal Mine Inspection

Hearings have been held three mornings of each week since May 16 on the Neely Federal Coal Mine Inspection Bill (S. 2420), with appearances made by U. S. Bureau of Mines engineers and representatives of the United Mine Workers of America as proponents. Strong opposition to the measure has been registered by representatives

speaking for Governors of States, by State Mining Departments, producers' associations and individual producers. The closing date for the hearings is indefinite because it is understood that representatives of the United Mine Workers of America expect to offer testimony in rebuttal to the mass of material which has been placed before the members of the House Mines and Mining Subcommittee by the opponents of the bill. On June 6, Julian D. Conover, Secretary, American Mining Congress, appearing in opposition to S. 2420, told the committee that "to make the Bureau of Mines a police agency, and to send a horde of Federal inspectors from Washington to duplicate the work of the State Mining Departments, would in our judgment destroy the spirit of teamwork and cooperation which sincere workers have so long striven to attain. It cannot be too strongly emphasized that safety cannot be achieved by 'strong arm' methods in the piling up of blanket laws and regulations by our Federal Government. Essential ingredients in any safety program are a safety consciousness and a spirit of mutual confidence between all concerned. The Bureau of Mines has nurtured that spirit and should continue to do so; it should not be transformed into an unwanted and unneeded police agency."

It had been charged by proponents of S. 2420 that the mines of Great Britain have a much lower accident rate on exposure basis than we have here in the United States. Mr. Conover explained to the committee that only 26 percent of the men employed in British mines are at the working faces whereas in the United States we have 65 percent of our underground employees at the face, and that hence our fatality record, based on actual exposure at the face, is superior to the record in Great Britain. This testimony clarified for the members of the subcommittee a point which the proponents of the bill had been using with considerable emphasis. It was also shown that British mining men have been studying the safety procedure in the modern mechanized mines in the United States and carrying our practice back to Britain, where it has been given much publicity in their mining journals and in the transactions of the British Institute of Mining Engineers.

Wage-Hour

Chances for partial correction of the evils of the Wage-Hour Act were frustrated by recommitment of the Barden and Norton bills to the House

Committee on Labor, and interest for the balance of the present year turns to the possibility of improvement in the administrative procedure under Colonel Philip B. Fleming's Wage-Hour Division. Field agents of the Wage-Hour Division are understood to be telling the managements of some mining properties in the West that they cannot reduce the basic wage paid to employees. In this connection it is interesting to note the following two paragraphs from a letter signed by Administrator Fleming setting forth the position of the Division on reduction in a base rate of pay:

"You asked whether 'the Wage and Hour Division would approve an arrangement whereby the basic wage for the employee would be reduced and a wage equivalent to the existing weekly rate be made up by overtime payments.' Our position with respect to this question is set forth in paragraphs 16 and 17 of the enclosed Interpretative Bulletin No. 4, especially in the last paragraph of page 8 thereof. If, in effect, the employer guarantees, expressly or impliedly, to his employees the same wage they received prior to the act for the same number of hours, in our opinion, the regular rate of pay must be arrived at by dividing the salary by the number of hours worked. The employer's manipulation of the rates to show a lower rate as his regular rate of pay will violate section 7 of the act.

"If, however, the employer actually reduces the regular rate of pay, then section 18 alone may be involved. As you know, no penalty is attached to a violation of section 18, and we are not prepared to proceed against an employer for such a violation. However, since an employer who acts contrary to section 18 is acting contrary to an express declaration of congressional policy, the Wage and Hour Division can not approve any arrangement involving such a violation."

The above statement is important because it is known that it was not the intention of the Senate and House conferees when they wrote the Wage-Hour Act in June, 1938, to attempt to place any such unconstitutional restriction on mine wages. It is to be hoped that a further clarification will soon be given to the industry by Administrator Fleming so that his field men may be better guided in their relation with the managements of mining enterprises.

National Labor Relations Board

Unmistakable expression of sentiment was registered by the House of Representatives on June 7, when by a vote of 258 to 129 the members passed the Howard W. Smith bill amending the National Labor Relations Act. While it is realized that chances are slim in the present session to drive the House-passed bill through the Education and Labor Committee of the Senate, it is certain that any prolonged session of Congress will witness a

strong effort for action. As the Smith bill passed the House it contained American Federation of Labor amendments which protect craft unions and extend from six months to a year the period for recovery of back pay. As now constituted the bill abolishes the present National Labor Relations Board, creating in its stead a new bipartisan Board of three men; creates an Administrator to handle work of prosecution and investigation; restores right of free speech; holds all collective bargaining units and representatives, as determined, to remain effective for one year; applies rules of evidence to Board hearings; requires basing of Board decisions on "preponderance of evidence"; removes mediation, conciliation and statistical services from Board; and protects employers caught in a cross-fire between two contending labor unions.

The so-called LaFollette "Civil Liberties Bill" passed the Senate on May 27, carrying a general prohibition of the use of special agents, strikebreakers and "industrial munitions." The bill gives the Secretary of Labor the power to bring action to enjoin or restrain any action violating the Act in the event that any person appears to be engaged or is about to engage in a violation. It is expected that a strong drive will be made in the House for the passage of this bill as soon as the revenue bill is out of the way, and it is known that the Administration desires its passage. At the time the bill passed the Senate it was amended to provide that not more than 10 percent of the employees in a plant can be aliens. There is a further amendment which limits the amount of money paid to alien employees to 10 percent of the total payroll. Senator Robert Reynolds of North Carolina had only the highest intentions when he put this amendment in the bill, but as it stands it may have a serious effect on the production of some of these strategic and critical metals necessary to the national defense.

Strategic Materials

A growing national defense consciousness has stimulated the attention of the legislative and administrative branches of the Federal Government into constructive action for the production and acquisition of strategic and critical metals and materials. Senator Murray of Montana and ten other Senators now have on the Senate calendar a bill (S. 4008) authorizing the Reconstruction Finance Corporation

(Continued on page 43)



Colorado's scenic attractions are world famed—and Colorado Springs has more than its share. The Garden of the Gods is in the outskirts of the city, and the summit of Pike's Peak can be reached by a thrilling auto trip in only an hour and a half

COLORADO SPRINGS PROGRAM SHAPED TO TIMES

GEARING its plans to the swift moving tempo of the momentous times now facing the Nation and the world, the Program Committee for the 7th Annual Western Metal Mining Convention and Exposition of the American Mining Congress recently met and drafted a slate of vital discussions keynoting the role of metal mining industries in meeting the raw material needs of the country in the present emergency. The convention, which will bring together some 2,000 of the nation's leaders in the metal mining industry, together with prominent manufacturers of equipment used therein, will convene at the Broadmoor Hotel in Colorado Springs September 16-19.

With Chairman J. C. Kinnear, general manager of Nevada Consolidated Copper Company, McGill, Nev., presiding, state and district chairmen and other prominent mining men serving under him went into an all-day huddle at Denver June 13 and selected from hundreds of advance suggestions a roster of subjects which form the very core of present-day metal mining success. Heading the timely list of general topics is the role of minerals in World War II; others of equal importance, since they have a vital bearing on the ability of the industry to meet emergency demands, are: labor problems; the financing of mining properties; taxation and government finance; legislation affecting mining; monetary questions; health and safety,

and mining and metallurgical problems of general interest.

State and district chairmen assisting Mr. Kinnear in developing a "knockout" program are shown in the accompanying box.

Cooperating closely in all activities concerned with the convention is Merrill E. Shoup, president of the Golden Cycle Corporation and chairman of the Board of Governors of the Western Division, American Mining Congress, which sponsors these annual meetings. Invaluable assistance in convention arrangements is being rendered by Robert S. Palmer, secretary, Colorado Mining Association and Colorado Chapter of the American Mining Congress.

Plans for formulating and handling the arrangements to insure a week of complete enjoyment and pleasant relaxation for all guests have been thoroughly discussed, and organization of committees in charge of this work is now being completed. The full roster of those responsible for these activities will appear in the July JOURNAL.

Heavy Demand for Exhibit Space

The unprecedentedly heavy demand for exhibit space is a sure indication that this year's Exposition—an inte-

gral part of each annual meeting—will top all previous records. In order to meet raw material demands in the huge armament program now under way, the metal mining industry must "streamline" to up-to-the-minute standards their equipment at properties now operating, and probably reopen and re-equip mines that have been idle in the recent past. Alert manufacturers will be on hand with much of this ultra modern machinery plus supply items with many novel innovations—all designed to better the efficiency of mining and milling the nation's metal wealth.

In addition, expert representatives of the manufacturers will be in each booth to talk over perplexing operating problems—and invariably they'll have an answer worthy of trial. They are the real "trouble-shooters," so don't miss this fine opportunity to meet them and talk things over.

Literally hundreds of cost-cutting machinery and supply items running the entire gamut of modern mine and mill operation will be on display by the nation's leading mine equipment manufacturers; a partial list showing those who have contracted for space at this early date follows:

Allen-Sherman-Hoff Co.
American Steel & Wire Co.

Anaconda Wire & Cable Co.
 Atlas Powder Co.
 Bethlehem Steel Co.
 Bucyrus-Erie Co.
 C. S. Card Iron Works Co.
 Carnegie-Illinois Steel Corp.
 Colorado Fuel & Iron Corp.
 Crane Company
 Crucible Steel Co. of America.
 Denver Fire Clay Co.
 Differential Steel Car Co.
 Dorr Company
 E. I. du Pont de Nemours & Co.
 Thomas A. Edison, Inc.
 Electric Storage Battery Co.
 Engineering & Mining Journal
 Gardner-Denver Company.
 General Electric Co.
 Goodman Mfg. Co.
 Hercules Powder Co.
 International Nickel Co.
 Jeffrey Mfg. Co.
 Kansas City Structural Steel Co.
 Link-Belt Co.
 Mancha Storage Battery Locomotive Co.
 Marion Steam Shovel Co.
 Mine Safety Appliances Co.
 Mine & Smelter Supply Co.
 Mining Congress Journal
 Mining World
 Morse Bros. Machinery Co.
 Ohio Brass Co.
 Owens-Corning Fiberglas Corp.
 John A. Roebling's Sons Co.
 Sauerman Bros.
 SKF Industries, Inc.
 Socony-Vacuum Oil Co., Inc.
 Sullivan Machinery Co.
 Tamping Bag Co.
 Templeton, Kenly & Co.
 Timken Roller Bearing Co.
 Traylor Engineering & Mfg. Co.
 U. S. Bureau of Mines.
 U. S. Steel Corp. Subsidiaries
 Victaulic Co. of America
 Western Cartridge Co.
 Westinghouse Elec. & Mfg. Co.

Colorado as a Vacation-Land

No further urging is needed for those who have already "tasted" the pleasures of Colorado's cool and lofty mountains as an ideal spot for a pleasant vacation. Those who haven't been there have missed an area of unrivaled beauty spots, where the scenic charm of snow capped peaks combines with the lure of trout-filled lakes and streams and the clear, bracing air to completely satisfy that yen to relax.

And Colorado Springs, nestled at the foot of mighty Pike's Peak, with cool, inviting canyons winding back into the foothills and the weird rock formations of the Garden of the Gods, typifies Colorado's scenic grandeur.

Program Committee

National Chairman

J. C. KINNEAR, Gen. Mgr.,
 Nevada Cons. Copper Co.,
 McGill, Nev.

State and District Chairmen

Alaska—H. L. FAULKNER, Counsel, Alaska Miners Association.
Arizona—H. M. LAVENDER, Gen. Mgr., Phelps Dodge Corp.
California—E. B. DeGOLIA, Pres., Gold Hill Dredging Co.
Colorado—J. PRICE BRISCOE, Pres., Clear Creek Gilpin Co.
Idaho—L. E. HANLEY, Pres., Hecla Mining Co.
Lake Superior District—CARL ZAPFFE, Mgr. of Iron Ore Properties, Northern Pacific Rwy. Co.
Mississippi Valley—JEAN McCALLUM, Mgr., St. Louis Smelting & Refining Works, National Lead Co.
Montana—D. M. KELLY, Vice Pres., Anaconda Copper Mng. Co.
Nevada—NOBLE H. GETCHELL, Getchell Mine, Inc.
New Mexico—T. M. CRAMER, Resident Mgr., U. S. Potash Co.
Northeastern District—RUSSELL B. PAUL, Resident Mng. Engr., The New Jersey Zinc Co.
Oregon—W. H. CULLERS, Pres. & Gen. Mgr., Sumpter Valley Dredging Co.
South Dakota—HARLAN A. WALKER, Asst. Gen. Mgr., Homestake Mining Co.
Southeastern District—C. L. BRANSFORD, District Mgr., Republic Steel Corp.
Texas—J. D. MacKENZIE, Mgr., Southwestern Dept., American Smelting & Refining Co.
Tri-State District—L. G. JOHNSON, Supt., Federal Mining & Smelting Co.
Utah—JAMES IVERS, Vice Pres., Silver King Coalition Mines Co.
Washington—LEWIS P. LARSEN, Pres., Pend Oreille Mines & Metals Co.

Then, winding up to Cripple Creek is one of the most beautiful drives in the world—Corley Mountain Highway; and equally impressive trips lead up steep and winding roads to the top of Pike's Peak, or to the Will Rogers Memorial lying close by the city. And only a short distance away to the

north is world-famed Rocky Mountain National Park.

Here, then, is the ideal chance to combine business with pleasure—you can bet your life the trip will be eminently worth while. So make your plans accordingly—and write for your hotel reservation PROMPTLY.



Arrangements are under way for scheduled trips by convention guests to the many famous mining and metallurgical operations near Colorado Springs. Pictured above is the Golden Cycle Mill, with the steep Front Range of the Rockies towering behind

PERSONALS



Walter S. Tower, executive secretary of the American Iron and Steel Institute since 1933, was unanimously elected president, chief executive officer and director of the Institute by the directors at the forty-ninth general meeting on May 23. He succeeds **Ernest T. Weir**, chairman of the National Steel Corporation, who has served as president for the past year.

In naming Mr. Tower, the Institute has adopted a policy of electing a paid president who will devote all his time to its affairs. This is regarded as the first official move by the industry in gearing itself to cooperate in fullest measure in the Government's huge national defense program.

F. F. Colcord, United States Smelting, Refining & Mining Co., and **E. H. Snyder**, Combined Metals Reduction Co., have been elected directors of the American Zinc Institute to fill vacancies in the 1941 class.

Roland Whitehurst, formerly manager of the Washington Branch The Electric Storage Battery Company, has been appointed assistant general



sales manager with headquarters at the home office of the company in Philadelphia. Mr. Whitehurst has been in the employ of this company since 1908, and has been manager of the Washington branch for 20 years. He will be succeeded as manager of the Washington Branch by

J. A. Klingensmith, who, as a member of the local Exide sales staff, is widely known there in business circles.

Robert T. Atkinson has been named operating manager for the Maiden mine of Kelley's Creek Colliery Co., Maidsville, W. Va.

D. L. Runion has been appointed superintendent of the Wyoming mine, Red Jacket Coal Corp., Red Jacket, W. Va.

P. G. Beckett, vice president in charge of mining operations for the Phelps Dodge Corporation, has been elected a director to fill the vacancy occasioned by the death of **Dr. L. D. Ricketts**.

Harry Fryer has been named superintendent of the Beech Bottom mine of Wheeling Steel Corp., at Beech Bottom, W. Va.

C. E. Walker is now general superintendent for the Pond Creek Pochontas Company's Nos. 1, 3, and 4 mines at Bartley, W. Va.

Charles W. Trust has been appointed general traffic manager of U. S. Steel Corporation Subsidiaries, succeeding **William S. Guy**, who is retiring upon completion of 49 years of service with subsidiaries and predecessor companies of U. S. Steel Corporation.

Pierre S. du Pont retired as chairman of the board and **Lammot du Pont** resigned as president of E. I. du Pont de Nemours & Company at a meeting of the Board of Directors May 20. **Lammot du Pont** was elected chairman of the board, and **Walter S. Carpenter, Jr.**, a vice president, was made president of the company.

John A. Payne has been elected president of Consolidated Coppermines Corp., with offices at 120 Broadway, New York City.

Cleveland E. Dodge, vice president of Phelps Dodge Corporation, has been awarded the Hundred Year Association's annual medal for outstanding service to the city of New York. Presentation was made by **Richard W. Lawrence**, president of the Chamber of Commerce of the State of New York and president of the New York Young Men's Christian Association, of which Dodge is an active member. He is also active in a number of other welfare and educational organizations.

Andrew Rostosky, Pittsburgh Coal Company scholarship student and freshman mining engineer at the Pennsylvania State College, had the highest standing of the freshmen in the School of Mineral Industries at the end of the first semester.

William G. Mather, chairman of the board of Cleveland Cliffs Iron Corp., has been made an honorary life member of the Union Club of Cleveland, with which he has been associated for the past 60 years. Only six other men have received similar honors.

H. R. Freeman has been appointed general manager of the Hetzel mine of Georges Creek Coal Company, Hetzel, W. Va.

Dr. Arno C. Fieldner, chief of the technologic branch of the U. S. Bureau of Mines, received Ohio State University's Joseph Sullivant medal at commencement exercises on June 10. The medal is awarded every five years "for an admittedly notable achievement on the part of a son or daughter of the university." Dr. Fieldner received his chemical engineering degree from Ohio State in 1906.

T. H. O'Brien, vice president and general manager of Inspiration Consolidated Copper Co., has been elected chairman of the board of directors of the Valley National Bank, an institution with branches in a number of Arizona cities. In this position Mr. O'Brien succeeds the late **Dr. L. D. Ricketts**, who died March 4, 1940.

John J. Crowe, formerly manager of the Apparatus Research and Development Department of Air Reduction Company, has been appointed assistant to **Herman Van Fleet**, vice president and operating manager. Mr. Crowe will direct the activities of the Apparatus Research and Development Department, and will coordinate these activities with similar activities for **Wilson Welder and Metals Co., Inc.** In addition, he will handle apparatus patent matters for Mr. Van Fleet.

—Obituaries—

Max W. von Bernewitz, mining and metallurgical engineer of the U. S. Bureau of Mines, died suddenly of a heart attack at his home in University Park, Md., May 18. His age was 61.

Born and educated in New Zealand, Mr. von Bernewitz came to this country after 16 years of mining and metallurgical experience in New Zealand, Australia and Dutch East Indies. Following mining work in Pennsylvania and Canada, he joined the staff of Mining and Scientific Press, then worked with Mines Handbook, and for a time was a member of the research staff of Battelle Memorial Institute for metallurgical research.

He has served as a member of the technical staff of the Bureau of Mines for about 17 years, and was the author of many bulletins and other papers dealing with mining and metallurgical subjects. He was a frequent contributor to **MINING CONGRESS JOURNAL**, and was the author of a widely known handbook for mineral prospectors.

Walter R. Hodge, widely known mining engineer, died April 24 in Eveleth, Minn., at the age of 56.

Rodney L. Brandt, vice president of the National Coal & Coke Co., died in Birmingham, Ala., May 6. His age was 43.

Thomas B. Lewis, former general superintendent of the Lehigh Navigation Coal Co., died May 12 following an illness since last July.

Harry Watkins, Sr., pioneer Alabama coal mining man, died May 5 in Birmingham following injuries received in an automobile accident.



NEWS and VIEWS

Shields Heads Utah Coal Association

Members of the Utah Coal Operators Association, with headquarters in Salt Lake City, recently elected the following members to serve as directors for the coming year: L. E. Adams, vice president, Spring Canyon & Royal Coal Companies; E. L. Cropper, secretary-manager, Chesterfield Coal Company; R. H. Harmer, vice president, Hi-Heat Coal Company; Moroni Heiner, president, Utah Fuel Company; Paul F. Keyser, president, Independent Coal & Coke Company; Paul L. Shields, assistant general manager, U. S. Fuel Company, and L. R. Weber, president, Liberty Fuel Company.

The newly chosen Board of Directors met shortly thereafter and elected the following officers: Paul L. Shields, president; L. E. Adams, vice president, and B. P. Manley, executive secretary.

Lake Superior Safety Meet

The 1940 mine safety meeting of the Lake Superior Mining Section of the National Safety Council will be held in Duluth, Minn., June 20 and 21 at the Hotel Duluth. Work on the papers and other program details was reported as well advanced a month ahead of time, and that there was a good demand for booth space at the accompanying exhibits by manufacturers.

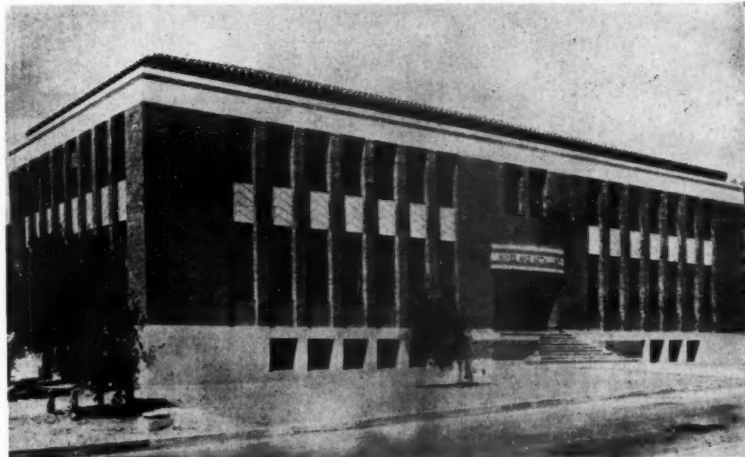
General Electric Pushes Tungsten Development

Indications of early active development of General Electric's new tungsten property in Lemhi County, Idaho, are reported from the field. Property is being equipped with necessary air compressors and other mining machinery, and preparations are being made for constructing a mill.

This activity follows the thorough testing of a 40-ton car of ore shipped from the property some time ago to the company's laboratories at Cleveland, Ohio.

The company has also purchased a ranch near the mine to obtain valuable water rights, and have acquired another tract of land for a camp site where construction of the necessary mine and camp buildings will be started this spring. Approximately 15 men are now being employed on the job.

Douglas Memorial Building For Mines And Metallurgy



Impressive ceremonies marked the dedication of the new Douglas Memorial Building for Mines and Metallurgy at the University of Arizona, Phoenix, May 27. Named in honor of Dr. James Douglas, one-time president of the Phelps Dodge Corporation, the new building is the gift of Phelps Dodge to the continued betterment of mining in this leading copper-producing state.

Louis S. Cates, president of the Phelps Dodge Corporation, came from New York to say, in formal presentation of the new building, that no state excels Arizona in efficient mining and metallurgical progress, and that riches still lie hidden in the mountains of the state. "The gift expresses a hope," he said, "that it will open a larger field of opportunity to those who desire to make mining and metallurgy their aim and goal."

Dr. Alfred Atkinson, president of the university, pledged the Institution to prepare fit men for effective service in mining engineering and related fields, and to plan intelligently research in the mining field.

The dedicatory exercises were held in the evening at the new building, and drew mining men and executives from the four corners of Arizona, from various points in the Southwest, and several from far points throughout the nation. Walter Douglas, president of the Southern Pacific Railroad Company of Mexico, came from Mexico City to speak on the life of his father; his address became the principal one at the dedication ceremonies, since Lewis W. Douglas, grandson of the copper mining executive, who was scheduled to deliver the dedicatory address, was held in New York City by pressure of busi-

ness. Others who participated in the program were Governor Robert Jones, of Arizona; M. O. Best, Phoenix, president of the University of Arizona board of regents; and Dr. G. M. Butler, dean of the College of Mines and Engineering.

A symposium on the history of mining in Arizona was held in the morning, and was participated in by the following: A. B. Parsons, secretary of the American Institute of Mining and Metallurgical Engineers; Dr. Frank B. Lockwood, member of the university faculty and eminent authority on pioneer life; and Dr. Thomas G. Chapman, who will assume his duties as dean of the new College of Mines on July 1.

The new building covers nearly 30,000 sq. ft. of floor space throughout two stories and a basement, and is constructed of reinforced concrete with brick outer walls, topped with tile roof—all completely fireproof. The construction contract amounted to \$106,670, and furnishings and permanent fixtures have cost \$10,500. The building will be occupied on July 1 by the College of Mines, newly formed as a separate academic unit—during the past 25 years it has been a part of the College of Mines and Engineering.

PETER F. LOFTUS

Consulting Engineers

ENGINEERING AND ECONOMIC SURVEYS, ANALYSES AND REPORTS ON POWER APPLICATIONS AND POWER COST PROBLEMS OF THE COAL MINING INDUSTRY

Oliver Building Pittsburgh, Pa.

Underground Mill at Big Missouri Mine, Stewart, British Columbia



Shown above is the ball mill chamber of the underground mill, with three 6' x 12' Cole-Bergman ball mills equipped with scoop feeders running in closed circuit with Dorr duplex classifiers. Two-compartment 16" x 24" Denver jigs with by-passes are placed between each ball mill discharge and classifier. Average daily tonnage of the mill for last quarter of 1939 was 711 tons. Reported capacity is 750 tons per day.

Approximate dimensions of the ball mill chamber, which includes a machine shop, are 178 ft. long, 37 ft. wide, with a domed ceiling about 45 ft. high at the center

Mines Awarded Honor Certificates By Joseph A. Holmes Safety Association

Outstanding instances of the exercise of courage and resourcefulness by workers in the mineral and allied industries in time of emergency were recognized by the Joseph A. Holmes Safety Association at its annual meeting held in Washington, D. C., April 16. Awards of 11 medals and four certificates of honor were made to individuals for meritorious effort in saving the lives of others. One hundred and twenty-six certificates of honor, in recognition of operation over long periods of time without fatalities or lost-time accidents or with remarkable low-accident records, were given to coal mining, metal mining, nonmetallic mining, and petroleum companies, and 43 certificates were given to individual workers who had established excellent long-time safety records.

The Joseph A. Holmes Safety Association, bearing the name of the first director of the Bureau of Mines, United States Department of the Interior, is closely affiliated with that bureau. In his annual report to the association, Dr. R. R. Sayers, acting director, Bureau of Mines, stated that the various awards of the association for 1939, totaling 175, were given to persons or agencies in the mineral industries in 23 states. The publication of the numerous ways in which safety in mining is being attained by the recipients of the awards acts as a strong stimulus to those in the industry who may be somewhat inclined to

lag in attention to the fundamentals of safety of operation, he stated.

The Association awarded certificates of honor for extraordinary safety achievement to coal mines or mining companies and to metal or nonmetallic mineral mines or mining companies, as follows:

Somerset Mine, Calumet Fuel Co.
No. 1 Mine, Carrs Fork Coal Co.
Olga No. 1 Mine, Carter Coal Co.
Olga No. 2 Mine, Carter Coal Co.
New Orient Mine, The Chicago, Wilmington and Franklin Coal Co.
Colonial Colliery Co.
The Colorado Fuel and Iron Corp.
Morley Mine, The Colorado Fuel and Iron Corp.
Consolidation No. 97 Mine, Consolidation Coal Co.
Mine No. 1, Crescent Mining Co.
Diamond Coal Co.
Mine No. 4, The Elk Horn Coal Corp.
Gay No. 1 Mine, The Gay Coal & Coke Co.
No. 41 Mine, Industrial Collieries Corp.
No. 42 Mine, Industrial Collieries Corp.
Slickville Division, Industrial Collieries Corp.
Mine No. 11, Island Creek Coal Co.
Mine No. 16, Island Creek Coal Co.
Henry Colliery, The Lehigh Valley Coal Co.
Prospect Colliery, The Lehigh Valley Coal Co.
Junior Mine, Howard Collieries, Norfolk & Western Railway Co. (Fuel Department).
Outside Force, Pond Creek Colliery, Norfolk & Western Railway Co.
Northwestern Mining & Exchange Co.
Tippie Crew, No. 3 Mine, Pond Creek Pocahontas Co.
Pursglove No. 2 Mine, The Pursglove Coal Mining Co.
Red Parrot Nos. 4 and 5 Mines, Red Parrot Coal Co.
Russelton Mine, Republic Steel Corp.
Lucerne Mine, Rochester & Pittsburgh Coal Co.
Stonega Mine, Stonega Coke and Coal Co.
No. 1 Mine, The Union Pacific Coal Co.
No. 4 Mine, The Union Pacific Coal Co.
No. 6 Mine, United States Coal and Coke Co.
Nos. 1 and 2 Mines, Winding Gulf Collieries.
Albany Open Pit Mine, Crete Mining Co.
Danube Open Pit Mine, Balkan Mining Co.
Bennett Open Pit Mine, Bennett Mining Co.
Bates Mine, Hanna Iron Ore Co.
Hiawatha No. 1 Mine, Hanna Iron Ore Co.

Wakefield Mine, Hanna Iron Ore Co.
James Mine, James Mining Co.
Mahoning Open Pit Mine, Mahoning Ore and Steel Co.
Fraser Mine, Oliver Iron Mining Co.
Hartley-Burt Mine, Oliver Iron Mining Co.
Section 16—Holmes Mine, Oliver Iron Mining Co.
Hull-Rust Mine, Oliver Iron Mining Co.
Volunteer Open Pit Mine, Palmer Mining Co.
East Vulcan Mine, Penn Iron Mining Co.
New Cornelia Branch, Phelps-Dodge Corp.
Minnesota Open Pit Mines, Pickands, Mather and Co.
Ironton Mine, Republic Steel Corp.
Penokee Mines, Republic Steel Corp.
Susquehanna Open Pit Mine, Republic Steel Corp.
Richmond Open-Pit Mine, Richmond Iron Co.
Sagamore Open Pit Mine, Sagamore Ore Mining Co.
Snyder Mining Co.
Ishkooda No. 13 Mine, Tennessee Coal, Iron and Railroad Co.
Buck Mine, Verona Mining Co.
Newport Mine, The Youngstown Mines Corp.
Inland Lime and Stone Co.
Dolomah Quarry, Tennessee Coal, Iron and Railroad Co.
No. 5 Limestone Mine, Tennessee Coal, Iron and Railroad Co.
Phosphate Mines, American Cyanamid Co.
United States Potash Co., Mining Dept.
Stonega Coke Works, Stonega Coke and Coal Co.
United Verde Branch—Smelter Div., Phelps-Dodge Corp.
Ore Treating and Sulfuric Acid Plant, Vincennes, Hill Zinc Co.
Blue Diamond Coal Co.
Ingleside No. 5 Mine, Carnegie-Illinois Steel Corp.
City Mine No. 3, City Coal Co.
Frederick Mine, The Colorado Fuel and Iron Corp.
Kebler Mine, The Colorado Fuel and Iron Corp.
Columbus Mining Co.
Consolidation No. 98 Mine, Consolidation Coal Co.
Hull Mine, DeBardeleben Coal Corp.
No. 9 Mine, Heilwood Division, Industrial Collieries Corp.
Wisconsin Coal Mines, International Harvester Co.
Nos. 1, 2, 4, and 6 Mines, Kelley's Creek Colliery Co.
Elkol Mine, Kemmerer Coal Co.
Ingram Branch Mine, The Koppers Coal Co.
Powellton No. 5 Mine, The Koppers Coal Co.
Sagamore Mine, The Pocahontas Fuel Co., Inc.
Indianola Mine, Republic Steel Corp.
Kent No. 4 Mine, Rochester & Pittsburgh Coal Co.
St. Clair Coal Co.
Banner Mine, Stanley Coal Co.
Derby No. 3 Mine, Stonega Coke and Coal Co.
"C" Mine, The Union Pacific Coal Co.
Winton No. 1 Mine, The Union Pacific Coal Co.
Biwabik Open Pit Mine, Biwabik Mining Co.
Mahnomon Open Pit Mine, Cuyuna Ore Co.
Scranton Open Pit Mine, Hoyt Mining Co.
Inter-State Iron Co.
Phelps-Dodge Corp.
Muscodia No. 4 Mine, Tennessee Coal, Iron and Railroad Co.
Monarch Quarry, The Colorado Fuel and Iron Corp.
Scott No. 2 Mine, Bethlehem Fairmont Coal Co.
Caretta Mine, Carter Coal Co.
Rockvale No. 3 Mine, The Colorado Fuel and Iron Corp.
Consolidation No. 25 Mine, Consolidation Coal Co.
No. 38 Mine, Davis Coal and Coke Co.
Coal Valley Mines, DeBardeleben Coal Corp.
Mine No. 7, Island Creek Coal Co.
Helen No. 5 Mine, The Koppers Coal Co.
Westmoreland Colliery, The Lehigh Valley Coal Co.
Pocahontas Nos. 33 and 34, The Pocahontas Corp.
No. 1 Mine, Pond Creek Pocahontas Coal Co.
Norton Mine, West Virginia Coal & Coke Corp.
Homer Mine, Homer Ore Co.
Hibbing-Chisholm District, Oliver Iron Mining Co.
Plymouth Open Pit Mine, Plymouth Mining Co.
Wagon Wheel Gap Mine, The Colorado Fuel and Iron Corp.
The Potash Company of America.

Companies Participating in Copper and Brass Exhibit

Thirty mining and smelting, wire and cable, and brass fabricating companies are participating this year in the Copper & Brass Industry Exhibit, Hall of Industry, at the New York World's Fair, which opened May 11.

The participating companies are:

Mining and Smelting Companies

The American Metal Company, Ltd.
American Smelting & Refining Company.

Anaconda Copper Mining Company.
Calumet & Hecla Consolidated Copper Company.

Consolidated Coppermines Corporation.

Copper Range Company.
Kennecott Copper Corporation.
Miami Copper Company.
Phelps Dodge Corporation.
Tennessee Copper Company.

Wire and Cable Companies

Anaconda Wire & Cable Company.
Kennecott Wire & Cable Company.
Phelps Dodge Copper Products Corporation.

Copper and Brass Fabricators

The American Brass Company.
Bridgeport Brass Company.
The Bristol Brass Corporation.
Chase Brass & Copper Co., Inc.
C. G. Hussey & Company.
The Miller Company.
Mueller Brass Co.
New England Brass Company.
The New Haven Copper Co.
Phelps Dodge Copper Products Corporation.
Revere Copper and Brass Incorporated.

The Riverside Metal Company.
Seovill Manufacturing Company.
The Seymour Manufacturing Co.
Stamford Rolling Mills Company.
The Thinsheet Metals Company.
Wolverine Tube Co.

Summer Meeting of West Virginia Coal Mining Institute

The program for the summer meeting of the West Virginia Coal Mining Institute, held June 14-15 at Bluefield, W. Va., included the following papers:

"Federal Price Regulation of the Bituminous Coal Industry," by T. E. Johnson, vice president, Hutchinson Coal Company.

"Technical Education of Men for the Coal Industry," by M. A. Forester, division superintendent, Consolidation Coal Company.

"Social Security Program," by John S. Stump, Jr., director of unemployment compensation for West Virginia.

"Organizing and Using Records in Coal Mining," by Grover Pyle, auditor, Pond Creek Pocahontas Company.

"Labor Relations as Applied to the National Labor Relations Act," by D. C. Kennedy, secretary of the Kanawha Coal Operators Association.

"Making Safety Programs Work," by C. J. Flippin, safety director of N. & W. Railway Fuel Department.

C. W. Connor, superintendent of mines, The American Rolling Mill Company, presided over the technical

sessions on Friday, at which an opening address of welcome was given by W. E. E. Koepler, secretary of the Pocahontas Operators Association.

Harry M. Moses, president, U. S. Coal & Coke Company, was the speaker at the banquet on Friday evening, and the meeting was concluded on Saturday with inspection trips to mines in the vicinity of Bluefield.

Ruby Mine to Close

Plans have been announced by Eagle-Picher Mining & Smelting Company to discontinue work at its Montana Mine operations at Ruby, Ariz., owing to exhaustion of ore. The operation has been producing since 1928, during which it has been known as one of the largest zinc and lead properties in Arizona.

Salt Lake Station of Bureau of Mines Dedicated



In a ceremony attended by hundreds of mining men from the intermountain empire and leading local citizens, the new Intermountain Experimental Station of the Bureau of Mines in Salt Lake City, Utah, was dedicated May 20.

The dedicatory address was delivered by Dr. R. R. Sayers, recently appointed director of the Bureau, at an outdoor ceremony in front of the building at 3 p. m.

"In taking over these quarters," Dr. Sayers said, "we are deeply conscious of the added responsibilities imposed upon us, and we shall endeavor to meet them to the limit of our ability."

Governor Henry H. Blood, of Utah, declared that mining will become increasingly important to the economic structure of the area, and expressed confidence that the improved experimental facilities offered by the new station will serve to expand this basic industry. Dr. George Thomas, president of the University of Utah, pledged the continued cooperation of the Utah engineering experiment station, a part of the university, and congratulated all who had expended

time and effort in bringing the new facilities to the area.

Presiding at the afternoon ceremony on behalf of the committee on arrangements was A. G. Mackenzie, secretary of the Utah Chapter of the American Mining Congress.

Other dedicatory events comprised a luncheon in the University of Utah Union Building, and a banquet that evening in the Hotel Utah.

Speakers at the banquet were Dr. A. C. Fieldner, chief of the technologic branch; Dr. R. S. Dean, chief engineer of the metallurgical division and director of the local station; City Attorney E. R. Christensen, representing Mayor Ab Jenkins; Herbert A. Snow, president of the Salt Lake Chamber of Commerce; and Dr. Sayers.

James W. Wade, president of the Tintic Standard Mining Company and chairman of the committee which arranged the dedicatory program, was toastmaster.

D. M. Kelly, vice president in charge of western operations of Anaconda Copper Mining Company, was scheduled to speak, but owing to the death of a close business associate he was unable to attend.

Metaline Mines Plan Increased Output

Increased activities at the Metaline Mining & Leasing and Brandview mine properties of the American Zinc, Lead & Smelting Company are expected in the near future. This announcement was made following the return of D. I. Hayes, of Spokane, manager of these properties, from an extended visit at the main office of the company in St. Louis.

During the past six months work has been largely confined to an exploration program of diamond drilling on both properties, and it is anticipated that development work prepara-

tory to mining will soon be started.

Before actual production can get under way at the Grandview mine, it will be necessary to complete the 700-foot inclined shaft, which is now down about 300 feet, and further development of the extensive ore bodies at the Metaline Leasing property will have to be accomplished before production is started there. It is estimated that this work will take about three months.

Ore from both these mines will be handled at the Grandview mill, with a capacity of about 400 tons per day; this plant has been improved and enlarged until it is one of the most modern mills in the West.

CORRECTION

Through an inadvertency, the winner of the first bout at the amateur fights at Cincinnati on May 1 was shown on page 38 of the May issue as Osborne. The real winner by unanimous decision of the judges, was Dick Daly, who now is the proud possessor of a Gruen wrist watch awarded to each of the triumphant fighters.

Consolidated Coppermines Makes Record Production

Mine production at the Consolidated Coppermines Corporation at Kimberly, Nev., for 1939 was the highest thus far attained by the corporation, according to a report by J. B. Haffner, vice president and general manager. A total of 2,327,922 tons of ore was produced containing 47,690,894 pounds of copper, of which 2,188,935 tons averaging 1.159 percent copper came from the Emma Nevada mine.

During the year 3,944 ft. of main level drifts were driven on the 6,660 level of the Emma Nevada mine, and this drifting program has carried operations to the extreme westerly end of the presently known ore body. In addition to main level drifts, 18,686 ft. of raises and slusher mining drifts were driven above the 6,660-level horizon. In the Morris-Brooks mine 298 ft. of main level drift was driven on the 570 level in order to secure samples of the newly developed Old Glory ore body.

During the year three methods of mining were employed in the Emma Nevada mine, namely, standard raise mining, slusher mining and sub-slusher mining, with careful cost analyses dictating the particular method to be applied to individual blocks. Of the total tonnage mined, 20 percent was produced by standard raise mining and 80 percent produced by slusher methods and mechanically handled. Total mining costs for the year were 5.3 cents less per ton than for the year 1938.

California Quicksilver

Announcement was recently made by Mr. Walter W. Bradley, state mineralogist, that a new and very timely map of California, showing all of the known quicksilver deposits of the state, has been published and is ready for distribution by the State Division of Mines, Department of Natural Resources. Since quicksilver is one of California's most important strategic minerals, of special value during time of war, and since the price has nearly doubled during the last few months, this map with all of its comprehensive marginal charts should be of world-wide interest. In round numbers, there are 2,000 properties in California, 200 of which have produced 92 percent of the total quicksilver mined in the United States.

Troubles of a Face Boss

A Face Boss's life is chuck full of woe,
The loader breaks down and the drill won't go.

The other shift leaves him lots of slate,
Before he can load coal it's half past eight.

Then the motor runs off the track,
With 69 minutes lost putting it back.

The water is off, he doesn't know why,
A door is knocked down when a trip goes by.

The smile on his face turns into a frown,
When on the cutter bar the roof sits down.

A hole can't be loaded 'cause the coal is soft,
Or slate cuts the wires and it won't go off.

The roadman has lots of bottom to dig,
The timbermen need help, for timbers are big.

This is only part of what happens all the time,
But I can't find words to make another rhyme.

When 25 cars are counted at the end of a day,
The F. B. has visions of a shovel on the W.P.A.

When I am dead and in my grave,
No more will I hear the Pit Boss rave,
And on my tombstone I want wrote,
"Trying to get production got my goat."

—By A Face Boss.

This nation ranks third in total world production, outranked only by the two famous districts of Almaden in Spain and Idria in Austria, the names of which have been used in California for its two famous districts, New Almaden and New Idria.

By means of red spots, the locations of individual deposits are indicated. The groupings of these spots demonstrate mineralized zones and suggest their relationship to geology. Variations in the spots indicate whether the quicksilver deposits are (a) consistent producers, (b) sporadic producers, or (c) merely mining claims, which have as yet not recorded economic production.

In the margin of the map is a wealth of information—largely in chart and map form on the subject of the quicksilver industry; a list of properties and their locations; world and national production; production by principal mines; relationship of this mineral product with all other mineral products in the state; commercial uses on percentage basis; descriptions of the economics and geology of quicksilver; data on the minerals and associated minerals of quicksilver; geologic relationships of the deposits; and a typical geologic cross-section.

This unusually comprehensive map was prepared under the direction of Olaf P. Jenkins, chief geologist of the Division's Geologic Branch. It is sold separately for 50 cents (including postage) plus state sales tax, 2 cents. Mr. Bradley also states that a complete treatise on the quicksilver resources of California by Alfred L. Ransome and John L. Kellogg has just appeared in the *California Journal of Mines and Geology*. This treatise, together with the map, should be of inestimable value to the mining world.

Pickands, Mather Fetes Newport Mine Force

Pickands, Mather & Co., was host May 18 at a dinner at the Newport Club, Ironwood, Mich., for the entire force of the Newport iron mine. This honor was paid the employees as a tribute to the remarkable safety record made at the Newport mine, where no lost-time accidents have occurred during the past 13 months. The Newport is one of the largest underground mines on the Gogebic range.

SUPREME COURT RULES COAL ACT CONSTITUTIONAL

That the Supreme Court's 8 to 1 decision upholding the validity of the Bituminous Coal Act of 1937 in the Sunshine Anthracite Company case flashed the "go ahead" signal on the establishment of minimum prices is the view of the Bituminous Coal Division of the Interior Department.

"With the aid of the Federal Government, the bituminous coal industry now can find the permanent relief from price-cutting it has sought for 15 years," Director Howard A. Gray of the Bituminous Coal Division, said following the Court's ruling. "The power of the Government to help the industry solve its problems is placed beyond doubt by the sweeping decision of the United States Supreme Court in the Sunshine Anthracite Company case, upholding the constitutionality of the Bituminous Coal Act of 1937. For the first time since 1934 when Federal efforts to stabilize the coal industry by price-fixing began, the constitutionality of this endeavor has been settled beyond further question." Mr. Gray also pointed out that the successful conclusion of the Sunshine case disposed of the last piece of litigation concerning the Division pending before the courts and that since July 1, 1939, the Division has won every case brought against it in any court.

"Establishment of minimum prices and marketing regulations for the sale of bituminous coal, which the Coal Act provides as a means of stabilizing the coal industry, now is but a short time away," the Director said. "They shall become effective at the earliest possible date after established, commensurate with the requirements of the law and the granting of proper notice."

Currently, hearings are being conducted on exceptions to the proposed minimum prices, and observers do not look for promulgation of final prices before July 1.

The Sunshine Anthracite Company has suffered adversely at the hands of the Supreme Court on one previous occasion. In the first Sunshine Anthracite Coal Company case, the company challenged an order issued by the old National Bituminous Coal Commission which ruled the company's coal within the jurisdiction of the Coal Act. The company contested the ruling, contending that its coal was anthracite, and lost its case at the U. S. Circuit Court of Appeals in St. Louis. This Court upheld the Commission's ruling, and the Supreme Court of the United States in November, 1939, refused to review the lower court's decision.

In the latest case, the company challenged the constitutionality of the act on the grounds that the tax on non-code members was a penalty.

Upholding the Coal Act, the majority opinion, read by Justice William O. Douglas, stated in part, "Official and private records give eloquent testimony to the statement of Mr. Justice Cardozo in the Carter case that free competition had been 'degraded into anarchy' in the bituminous coal industry. Overproduction and savage, competitive warfare

wasted the industry. Labor and capital alike were the victims. Financial distress among operators and acute poverty among miners prevailed even during periods of general prosperity.

"It was the judgment of Congress that price-fixing and the elimination of unfair competitive practices were appropriate methods for prevention of the financial ruin, low wages, poor working conditions, strikes, and disruption of the channels of trade which followed in the wake of the demoralized price structures in this industry. If the strategic character of this industry in our economy and the chaotic conditions which have prevailed in it do not justify legislation, it is difficult to imagine what would. To invalidate this act we would have to deny the existence of power on the part of Congress under the commerce clause to deal directly and specifically with those forces which in its judgment should not be permitted to dislocate an important segment of our economy and to disrupt and burden interstate channels of trade. That step could not be taken without plain disregard of the Constitution. There are limits on the powers of the states to act as respects these interstate industries. If the industry acting on its own had endeavored to stabilize the markets through price-fixing agreements, it would have run afoul of the Sherman Act. But that does not mean that there is a no man's land between the state and Federal domains. Certainly what Congress has forbidden by the Sherman Act it can modify. It may do so, by placing the machinery of price-fixing in the hands of public agencies. It may single out for separate treatment, as it has done on various occasions, a particular industry and thereby remove the penalties of the Sherman Act as respects it. Congress under the commerce clause is not impotent to deal with what it may consider to be dire consequences of laissez-faire. It is not powerless to take steps in mitigation of what in its judgment are abuses of cut-throat competition. And it is not limited in its choice between unrestrained self-regulation on the one hand and rigid prohibitions on the other. The commerce clause empowers it to undertake stabilization of an interstate industry through a process of price-fixing which safeguards the public interest by placing price control in the hands of its administrative representative. That was the choice which Congress made here. There is nothing in the Carter case which stands in the way. The majority of the Court in that case did not pass on the price-fixing features of the earlier act. The Chief Justice and Mr. Justice Cardozo in separate minority opinions expressed the view that the price-fixing features of the earlier act were constitutional. We rest on their conclusions for sustaining the present act."

The majority opinion ruled that the 19½ percent penalty tax provided for in the Coal Act was applicable to the Sunshine Company since its sales were subject to regulation. As to the imposition of the tax, the Court states "Congress may impose penal-

ties in aid of the exercise of any of its enumerated powers."

The decision subjects the Sunshine Anthracite Company to payment of back taxes, said to amount to over \$15,000.

The lone dissenter in the case was Justice McReynolds who held in a minority opinion "that the act under review is beyond any power granted to Congress."

Diesel-Electrics to Haul Iron Ore from Largest Open-Pit Iron-Ore Mine In the World

The first Diesel-electric locomotives for the Mesabi iron range of the Lake Superior district will go into service in June in the Minnesota properties of the Oliver Iron Mining Company, a subsidiary of the United States Steel Corporation. Of the 10 Diesel-electric locomotives going into service, seven are equipped with General Electric apparatus installed in locomotives built by the American Locomotive Company.

These locomotives, rated 1,000 hp. and weighing 125 tons each, will be used from 16 to 24 hours per day to haul trains of loaded ore cars from open pit mines, 200 to 400 feet deep on a two- to eight-mile haul to the top of the pit. The locomotives will push or pull the trains over the switchbacks and up heavy grades with 5 percent maximum against the load.

High tractive effort, less smoke, and ability to negotiate sharp curves were among the reasons for the selection of Diesel-electric locomotives.

The Oliver Iron Mining Company's Hull-Rust property at Hibbing is a huge excavation, 350 feet deep, 2½ miles long and a mile wide. Including the glacial overburden that covered the ore, more material has been taken from this pit than was removed in building the Panama Canal.

The 60 miles of standard gage railroad track used in the Hull-Rust pit at Hibbing is shifted to new locations as mining progresses. This track shifting is accomplished by means of locomotive cranes which lift the track in 30-ft. sections.

Columbia Offers New Study Program

A new program of study in the field of mineral dressing, broadened to include the preparation of all crude minerals for industrial use, will be introduced into the engineering curriculum of Columbia University next year under the direction of Professor Arthur F. Taggart, it is announced. The innovation marks the first academic recognition granted to mineral dressing, hitherto concerned chiefly with the extraction of metals from metallic ores, as a profession in itself.

The new curriculum will train men for the technological work which bridges the gap between the extraction of crude minerals from the earth

and their preparation for consumer use. Courses will deal with the chemical and mechanical treatment of the useful constituents of the earth's crust, such as coal, phosphate and iron, and the refining of liquid minerals, principally petroleum.

Opportunities for employment in mineral dressing for both recent and experienced practitioners are relatively plentiful and steady, Professor Taggart reports. Students specializing in mineral dressing in the past were placed readily upon graduation even during the depression period. In fact, according to Professor Taggart, there are several standing requests for recommended graduates in this field.

U. S. Steel Contributory Pension Plan

B. F. Fairless, president of United States Steel Corporation, has announced the establishment of the United States Steel Contributory Pension Plan, provision for which was made when the pension rules of the Corporation Pension Plan were revised last December.

The Corporation Pension Plan has provided retirement pensions to employees since 1911. When the pension rules were revised last December, in anticipation of the commencement of payments under the Social Security Act in January, 1940, provision was made to continue pension credits for service prior to 1940. In addition the rules as then revised continue to make provision with respect to special retirement conditions and to employees retiring after 1939 until they qualify for Federal or State Old-Age Retirement Benefits. These provisions are not affected by the United States Steel Contributory Pension Plan.

The new Contributory Plan makes provision for retirement pensions with respect to service after 1939 for those employees whose earnings are in excess of \$3,000 per year, or \$3,600 per year in the case of railroad employees. Earnings under these limits are not covered by the Contributory Plan for the reason that the Federal Pension Laws—the Social Security Act and the Railroad Retirement Acts—provide pensions with respect to such earnings.

Thus, by means of the United States Steel Contributory Pension Plan and the Public pension plans, pension coverage with respect to all employee earnings is now available to all employees.

The Contributory Plan is intended to provide an annual pension for life, upon retirement at age 65, of 1 percent of the aggregate eligible compensation (amount in excess of earnings taxable under the Federal Pension Laws) received by an employee during participation in the plan. Approximately 11,000 employees are eligible to participate in the plan.

As in the case of Federal Pension Plans, where the cost of public pensions is provided by the joint payments of employees and employing companies, through the medium of taxation, the cost of the pensions under the United States Steel Con-

tributory Pension Plan will be met by the contributions of participating employees and the payments of their employing companies. Employees participating in the plan will contribute 3 percent of their earnings in excess of \$3,000 per year, or \$3,600 as the case may be, and the employing companies will provide such varying amounts, which it is expected will be substantially in excess of the contributions of participating employees, as may be required to cover the cost of the plan.

The funds of the Contributory Pension Plan will be trusted with the Guaranty Trust Company of New York.

Domestic Chrome Ore Bid

Opening of bids on chrome ore by the United States Treasury Department, Procurement Division, in Washington, D. C., on May 24, revealed that efforts to establish a chrome industry on the Pacific Coast are meeting with some success. As chrome has been designated as one of the "seven strategic war minerals," the United States Government has been interested in the development of a domestic supply—the more so since practically all chrome consumed in the United States is imported.

Although the United States' armament program has emphasized the military uses of chrome, the metal's

greatest industrial importance undoubtedly lies in the fact that it is a necessary ingredient in the production of all "stainless" steels.

The United States Chrome Mines' bids were for delivery of 5,000 tons of natural lump ore to the U. S. Ordnance Depot at Ogden, Utah, for \$150,000 and for delivery of 12,500 tons of synthetic lumps f.o.b. cars at Philadelphia Harbor for \$362,500. The two bids, in addition to being the lowest, taking into consideration the 25 percent preference differential allowed domestic producers, also represented the largest tonnage of either foreign or domestic origin, offered by any bidder.

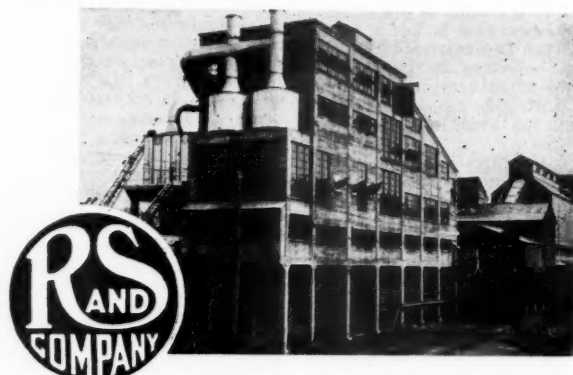
Other bidders and their bids were as follows:

E. J. Lavino & Co., Philadelphia, 12,500 tons of South African ore at \$24.50 a ton delivered at Philadelphia.

Bradley & Ekstrom, San Francisco, 5,000 tons of Philippine ore at \$33.82 a ton, delivered at Ogden, Utah.

Industrial Mining Co., 2,000 tons of domestic ore mined in Washington at \$51.36 a ton, delivered at Philadelphia.

Alwyn H. Wild, president of the United States Chrome Mines, Inc., with his brother, Ronald Wild, were the inventors of the original process covering the direct use of chromium ore in the manufacture of stainless steel. Mr. Wild is a former president of the Rustless Iron and Steel Corporation of Baltimore, Md., which



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When you choose a combination wet and dry cleaning plant your coal cleaning problems are ended. You eliminate the necessity of selective mining and you're prepared for the full advantages of mechanical loading—because your prepared coal is premium fuel.

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probably is the largest exclusive manufacturer of stainless steel in the world.

The United States Chrome Mines, Inc., is now producing high-grade chrome concentrates at its plant in El Dorado County, Calif., and also owns six other valuable chrome properties in California.

Rogers Chosen by Virginia Association

Members of the Virginia Coal Operators Association, meeting April 17, reelected all members of the Board of Directors as follows: P. F. Brown, R. S. Graham, Lee Long, J. L. Osler, Chas. E. Ralston, J. D. Rogers, J. J. Sellers, J. P. Shockey, and W. H. Sienknecht. New officers for the Association were later elected as follows: J. D. Rogers, president; Chas. E. Ralston, vice president; George H. Esser, secretary-treasurer, and E. H. Robinson, assistant secretary-treasurer.

Steelmaking in Technicolor

An air-conditioned moving picture theatre has been added to the United States Steel Subsidiaries Exhibit at the New York World's Fair in order to make possible the presentation of the technicolor movie, "Men Make Steel."

"Men Make Steel" was filmed by a Hollywood crew. The equipment, direction and technique are the same as are used in making a Hollywood feature production. The actors, however, are the men who make steel and the scenes are scenes of actual steel operations photographed at the ore mines and inside the great mills where steel is made and rolled into finished forms. The picture, in addition to telling a story of steelmaking, presents scenes of extraordinary beauty as the technicolor camera records the brilliant colors peculiar to flashing, molten metal. The narrative accompanying "Men Make Steel" is presented by Edwin C. Hill, and the musical score, especially prepared for the picture, was recorded under the direction of Robert Armbruster.

Along with the moving picture theatre on the second floor of the exhibit are a series of dioramas forecasting how steel may serve in the future.

Largest Belt Conveyor "Moves Rain" In California Valley



"It's moving the rain from the north to the south end of Central Valley," residents of Redding, Calif., explained to tourists who marvel at the new $9\frac{1}{2}$ -mile-long belt conveyor that stretches from Redding to Coram.

Friant Dam at the south end and Shasta Dam at the north end of Central Valley will, when completed, impound and give even distribution to the rainfall in this grape, olive and orange growing country where recurring droughts and floods inflict such heavy damage.

Already sand and gravel is pouring at a fast dog-trot into Shasta Dam cement mixers on this huge conveyor. A train of gondola freight cars reaching from Boston to New Orleans would be required to carry the load this, the largest belt conveyor in the world, will have carried by 1944 when this dam is completed.

These dioramas include a forecast of possible future developments in pre-fabricated steel housing; an imaginative representation of a hydrophonic tomato farm, where all activities from irrigation to reaping are controlled by radio; and a working model for the City of the Future, where all traffic runs smoothly when regulated by central grouping.

The first floor of the exhibit features animated dioramas showing the four basic steps in the production of

The Shasta Dam conveyor is divided into 26 interlocking units, 23 of which are powered with 200 horse power electric motors. The other three operate by gravity on down grades. Twenty miles of 36-inch-wide, 6-ply belt ride on 40,500 Rex idler rolls, equipped with 83,000 Timken tapered roller bearings, which eliminate friction and reduce maintenance costs to a minimum.

The conveyor runs through the middle of an 80-foot right-of-way cleared through manzanite brush and is mounted on wooden bents which rise to a height of 90 feet in some places as it crosses above the Sacramento River, a state highway, five county roads, four creeks and the main line of the Southern Pacific Railroad.

The maximum sand and gravel requirement at the dam is 22,000 tons per day. The conveyor can deliver 26,400 tons in 24 hours.

steel: the mining of ore, the smelting of ore, the making of steel, and the rolling of steel. Each of the dioramas is explained in detail by skilled commentators chosen from the working staffs of various subsidiary plants of United States Steel Corporation.

Steel's exhibit is housed in its own building located on the Plaza of Light. The building's gleaming stainless steel dome, brilliant by day as well as by night, serves as a natural beacon to visitors at the Fair.

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Iron Ore at Steep Rock Lake

The development of the hematite iron-ore deposits underlying Steep Rock Lake, 135 miles west of Fort William in northwestern Ontario, has progressed considerably in recent months, according to Consul Warwick Perkins, Toronto. This is true both in the exploration of the ore bodies by geophysical methods and core drilling and in the sinking of the shaft alongside the lake, from which cross-cuts will be driven into the ore body which is now definitely outlined over an area more than 3,500 feet long and ranging in width from about 150 to 300 feet.

The vertical three-compartment shaft has passed the 800-foot mark, where a station has been cut and a crosscut toward the ore has been begun. The shaft will be continued down to 1,200 feet. It is planned to carry the crosscut out 1,200 feet and then cut a diamond-drill station, from which drill holes will be fanned out to cut through the ore body at various points; meanwhile, the crosscut will be continued out to the ore (about 800 feet farther). The owners hope to reach the ore next August.

In a recent advertisement, the company announced plans for initial production on a basis "of at least 2,000 tons daily in 1940," but this time limit is regarded as optimistic by some qual-

ified observers, who do not expect production to be under way before 1941.

Breaking up of the ice on the lake has forced the suspension of diamond-drill exploration, but hard ore has already been found approximately 7,000 feet south of the main ore body and explored over a length of about 1,500 feet with no indication that the limit has been reached. Widths of more than 100 feet have been established. One thousand feet south of this deposit, ore has again been struck. If this is continuous with the 1,500 feet of ore to the north, the total length of the bed is at least 2,500 feet. A third deposit has been discovered in the "East Bay" area of the lake, which has been followed for a length of 1,000 feet; and while the average width is not yet known, drilling has shown it to be at least 250 feet in width at one point.

The company believes that the drilling done thus far indicates the presence in the first or "main" ore body of more than 100,000,000 tons of ore "in the first 1,000 feet of ore depth." None of the drill holes, however, have been carried into the ore for more than 5 to 10 feet. Tests are said to indicate a probable metallic iron content of 56 to 60 percent, low phosphorus, and the consequent possibility of shipping the ore as mined, without beneficiation. Any more definite statement concerning the exact characteristics

of the ore is not possible, of course, until test shipments have been made and run through a blast furnace.

It is also not possible to say as yet that serious technical difficulties will not be encountered, such as heavy water seepage. The rock that exists on the "hanging wall" of the ore is porous and might conduct much water. On the other hand, the 150 feet of clay, sand, and gravel on the bed of the lake may prove to be an effective water seal. It is also possible that future exploration may establish the presence of sufficiently large quantities of high-grade ore to justify draining the lake and reaching the hematite by stripping off the overburden. Considerable time must elapse, and much work be done before the feasibility of this method of exploitation can be determined.

Permissible Electrically Operated Mine Pumps

The safety features relative to prevention of gas or dust ignition in coal mines are given in detail for 24 "permissible" electrically operated mine pumps in a report recently published by the U. S. Bureau of Mines.

The small pump which falls under the classification of "gathering pumps" operates unattended probably more than any other electrically driven machinery in a mine. Therefore, from the standpoint of fire and explosion hazard, especially in a gassy mine, it is imperative that the electrical circuit to the pump be installed and protected most carefully; also that the pump motor and its control be of a design and construction that will safeguard against ignition of gas and dust. This latter requirement can be satisfied by the use of permissible pumps.

Report of Investigations 3497, "Permissible Electrically Operated Pumps," by L. C. Ilsley, E. J. Gleim, and H. B. Brunot, supplies detailed descriptions of the safety features of the various mine pumps which have been approved as permissible by the Bureau of Mines for the information of inspectors, safety engineers and other interested parties. Copies of this report may be obtained without charge from the Bureau of Mines, Washington, D. C.

Large Tungsten Tailings Plant

The Nevada-Massachusetts Company is planning construction of a 1,000-ton tailings plant at its property seven miles west of Mill City, Nev. The mill will be located below the tailings pond, which contains an estimated 850,000 tons of materials resulting from milling operations over the past 15 years.

The company's 250-ton mill on the Mill City property continues to operate at capacity, and it is reported that the company is building a 50-ton pilot plant at Mill City for a tungsten-manganese property near Galconda. Ott F. Heizer, of Mill City, is manager of the company.



LOAD DISTRIBUTOR for Motor-Generator Sets

The Type LDR Load Distributor is now improving motor-generator set performance in some of the leading operations in the mining industry.

Used with motor-generator sets operating in parallel in the same trolley and feeder system, the Load Distributor keeps the generator nearest the load, with its comparatively higher voltage, from taking more than its share.

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5. Lessens Commutator Burning
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Bulletin 3904 describes the I-T-E Load Distributor and includes charts from actual mining installations.

At right above—The Load Distributor mounted on a 16" x 19" panel, can be installed quickly in the positive generator circuit. A glass panelled, dust proof cover protects the mechanism.

Representatives in Principal Mining Areas

I-T-E CIRCUIT BREAKER CO.
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New Industrial Control Standard

The National Electrical Manufacturers Association announces the release of a new Industrial Control Standard superseding the edition of August, 1937. The new publication contains general standards and definitions applying to resistors, contactors, brakes, auto-transformers and reactors, a-c and d-c controllers; machine tool, synchronous motor, printing press and mine hoist control; magnetic control for steel mill auxiliaries, overhead traveling and floor operated cranes; terminal markings and guides to specifications for building equipment control apparatus. Copy of the Standard may be obtained for \$1 by writing to the National Electrical Manufacturers Association, 155 East 44th Street, New York, N. Y.

Iron Mines Increase Operations

Present operating schedules at the Greenwood and Morris mines of Inland Steel Company at Ishpeming, Mich., will be maintained for the rest of the year, according to a recent statement by Clarence B. Randall, vice president in charge of operations, during an inspection visit at the mines. At Negaunee, general superintendent W. M. Webb of Republic Steel Corporation announced iron ore mining operations at the Cambria-Jackson mine will be increased from four to five days a week, this change also applying to the corporation's Penokee mines at Ironwood. Two months ago the work week at these mines was reduced to four days per week.

Investigate Manitoba Molybdenite

Molybdenite has been found in the pegmatite areas of Manitoba, but preliminary developments have not yet proved that sufficient quantities for commercial development are available. An interesting discovery is reported on the east shore of Lake Athapapaskow, four miles from the town of Cranberry Portage. Eastern Canadian mining interests have been interested enough to offer a cash payment and to guarantee a specified amount for diamond drilling and pre-

liminary development work. The molybdenite exists as fine flakes and streaks along numerous fractures in a fine-grained granitic rock, and is also disseminated throughout the rock. The occurrence is definitely unlike the more massive, irregular molybdenite samples typical of the pegmatic type of deposit.

The shear zone has been traced on the shore and outcropping on islands for 4,000 feet and up to 60 feet in width. Chip sampling shows one sample of ore carrying 1.22 percent molybdenite and \$5.60 per ton in gold across 10 feet; another sample of 0.85 percent molybdenite, over 4 feet; and a third sample of 2.83 percent molybdenite and \$3.50 in gold, across 12 feet.

Molybdenite production has been insignificant in Canada since the World War. In 1938, only 7 tons were mined, but early in 1939 prospecting was done in Ontario, Quebec and British Columbia, chiefly by five companies. About 200,000 pounds of calcium molybdate is imported annually, all from the United States, as well as alloys containing molybdenum. In 1917, 1,554 tons of ore containing 330,000 pounds of MoS₃ was shipped to Great Britain, and later ore was exported to the United States and France. All was mined in Ontario and Quebec.

Western Office for Mining Exploration Opened by Freeport

A branch office in Reno, Nev., for the investigation of mineral deposits in the West and the development of new mining opportunities has been opened by the Freeport Sulphur Company, it was recently announced. The address is 443 Gazette Building.

A. A. Gustafson, mining engineer, will be in charge of the Western exploration, and he will be assisted by Ralph Taylor and David L. Evans, geologists. Gustafson and Taylor have been with the company for a number of years, while Evans joined the Freeport organization recently.

The Freeport company, oldest American sulphur producer now operating, mines sulphur at Port Sulphur, La., and at Freeport, Tex., and manganese at Cristo, Oriente province,

Cuba, through its subsidiary Cuban-American Manganese corporation. Main offices are at 122 East 42nd Street, New York City.

Two of the mines now being operated by Freeport—the Grande Ecaille sulphur mine in Louisiana and the manganese mine in Cuba—were developed within the past 10 years.

The Grande Ecaille deposit was developed in 1933 despite unusual engineering difficulties resulting from the unstable marshy terrain of the Mississippi delta. Part of the deposit was beneath the waters of Lake Grande Ecaille and part beneath marshland so soft that piling sank 45 feet without being struck by a pile driver. More than 400,000 tons of sulphur were mined there last year.

The Cuban manganese development was started in 1931. The undertaking encountered such setbacks as three major floods, an earthquake and a revolution, as well as metallurgical difficulties, but a process was eventually perfected for concentrating the low-grade Cuban ores to the grade required for use by the American steel industry. Production is now at the rate of approximately 100,000 tons of high-grade ore a year.

Washington Mine Developments

New mining operations getting under way in the State of Washington include the facilities for ore production and storage at the Cleopatra mine on Miller River, the reopening of several properties in the Monte Cristo area, the development of the old Blewett mine on the Blewett highway, the diamond drill prospecting of the alunite deposit east of Enumclaw, installation of concentrating facilities in the northern Okanogan tungsten mines, and construction of the 100-ton concentrating plant at property No. 3 of Consolidated Mines and Smelting Company on the new 100-mile-long lake formed by Grand Coulee Dam.

Wheels of Government

(Continued from page 31)

to make loans up to \$40,000 for the development of deposits of gold, silver and strategic and critical minerals "of value to the United States in time of war." Another bill (S. 3938) authorizes the RFC to create corporations to acquire and carry in stock strategic and critical materials. These corporations are empowered to make payment against the purchase price to be paid for these materials in advance of deliveries. The army and navy appropriation bills supplemented by Administration requests bring the total which will be available for strategic and critical materials appropriation to over \$200,000,000, and the organization to guide the procurement of the metals and minerals is now being created under Mr. Stettinius, Dr. C. K. Leith and many other capable men.

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Steel Institute Elects Five New Directors

Five new members have been elected to the Board of the American Iron and Steel Institute, to fill vacancies in each case. These are Elton Hoyt, II, of Cleveland, managing partner of Pickands, Mather & Co.; Thomas R. Akin of St. Louis, president of Laclede Steel Co.; W. H. Sommer of Peoria, Ill., president of Keystone Steel & Wire Co.; John T. Whiting of Conshohocken, Pa., president of Alan Wood Steel Co., and D. A. Williams of Kokomo, Ind., president of Continental Steel Corp.

BOOK REVIEWS

TECHNOLOGY, EMPLOYMENT, AND OUTPUT PER MAN IN COPPER MINING, by Y. S. Leong, Emil Erdreich, J. C. Burritt, O. E. Kiessling, C. E. Nighman, and George C. Heikes. *Works Project Administration, National Research Project, in cooperation with Department of the Interior, Bureau of Mines. Report No. E-12. Philadelphia, Pa., 1940; 260 pp.*

This report presents an analysis of long-time changes in production, employment and output per worker; considers the fundamental factors affecting the output per worker, particularly advances in technology and the growth in physical handicaps, and finally endeavors to ascertain the probable changes in employment in the copper mining industry in the next decade, and over a longer period on the basis of the anticipated trend in copper consumption, the availability and character of the reserves and the expected developments in technology, mining conditions, and other major factors.

Based on certain stated assumptions, it is estimated that in open-cut mines the average output per man-hour in 1947 is likely to reach about 3 tons of ore (a 45 percent increase over the 1923-31 average), or 52 pounds of copper; and that in underground mines the average output in 1947 will be about 0.74 ton of ore per man-hour (0.44 ton for 1923-31), or 26 pounds of copper.

In reviewing all the Technology and Output Per Man reports issued cooperatively thus far by the WPA and Bureau of Mines, the immediate reaction is that far too much effort has been expended on detailed descriptions of simple operations which are only too well known by any mining man or even college student in mining—elemental textbook material.

But after all, it is probable that these reports have been compiled primarily not for the mining industry itself but for sociological workers delving into problems of employment in the United States and probable future trends. As such, they are well done, although admittedly the variables determining future and even past productivity trends are so multitudinous and intangible that conclusions are necessarily highly tentative.

Features particularly worthy of mention in this copper report comprise the wealth of statistical data on production, employment and produc-

tivity in the Appendix, tabulated conveniently by various categories (care has been taken to group states to prevent revelation of data on individual operations), and the series of pen-and-ink sketches showing various mining methods used in extracting copper ore.

It is a little surprising to read in the chapter on "Future Outlook" that decline in strip-mine output resulting from cessation of work at the United Verde and Sacramento Hill mines will probably be "counterbalanced by the future output from the Clay mine [Morenci pit], which may begin large-scale excavations in the next few years." (Italics ours.) Certainly the widespread development program at Morenci during the past several years merits better attention than has apparently been accorded it.

With only a relatively small supply available, requests for copies of the report should be sent promptly to Publications Section, Division of Information, Works Progress Administration, Washington, D. C.

INTRODUCTION TO MINE SURVEYING, by W. W. Staley, University of Idaho School of Mines. Stanford University Press, Stanford University, California. 1939; 275 pp. Price \$3.50.

Written to fill an outstanding gap in mining textbooks (the last treatise on mine surveying appeared 25 years ago), the author has done an admirable job in bringing information on procedure, technique and instruments on mine surveying up to date. To assure authenticity, practicality, and an adequate nucleus for the discussion, a sizable questionnaire was sent to prominent mining companies—both large and small, including gold, silver, copper, lead and zinc—in the United States and Mexico.

The book is written for use by readers who have had basic training in surveying—as a result, very little space is devoted to the theory underlying principles of surveying; nor is there a prolonged discussion of such matters as the theory of errors. Everything aims at presenting the actual problems met in mine surveying, together with the most practicable methods developed to date in solving them.

Chapter headings reveal the nature of content as follows: Instruments and Equipment; Angles and Linear Measurements; Bearing and Azimuth; Determination of True Meridian; Underground Traversing; Stope Surveys; Transferring the Meridian; Problems in Mine Surveying; Triangulation System for Mining Property; Tunnel Surveys; Compass Surveys; Notes and Calculations; Maps and Sections; Bore-Hole Surveys; and Coal-Mine Surveying.

Well-chosen references are listed at the ends of chapters for those desiring additional details, and there are ample sketches throughout the book to illustrate various techniques and procedures. The book will find a well-merited use by mining school students throughout the country, and as a convenient reference work for engineers now on the job who may find therein a better way of doing their day-to-day work.

PUBLICATIONS OF INTEREST

U. S. Bureau of Mines

- R. I. 3471. ACTIVE LIST OF PERMISSIBLE EXPLOSIVES AND BLASTING DEVICES APPROVED PRIOR TO JUNE 30, 1939. 25 pp.
- R. I. 3477. MANGANESE AND ITS ALLOYS, by R. S. Dean, C. Travis Anderson, Cresap Moss, and P. M. Ambrose. 47 pp. 32 figs.
- R. I. 3480. ANNUAL REPORT OF THE METALLURGICAL DIVISION, FISCAL YEAR 1939, by R. S. Dean. 98 pp. 26 figs.
- R. I. 3484. ORE-TESTING STUDIES, 1938-39 (PRIMARILY ORE-DRESSING), by A. L. Engel and S. M. Shelton. 34 pp. 10 figs.
- R. I. 3487. TESTS ON THE EFFECT OF ACID MINE WATERS ON VARIOUS CEMENTS, by R. D. Leitch and J. G. Calverley. 7 pp. 2 figs.
- R. I. 3488. USE OF RESPIRATORY PROTECTIVE DEVICES UNDER ABNORMAL AIR PRESSURE, by F. E. Griffith and H. H. Schrenk. 9 pp.
- R. I. 3491. ELECTROMETALLURGICAL INVESTIGATIONS, by J. Koster and M. B. Royer. 23 pp. 3 figs.
- R. I. 3494. FLOCCULATION AS AN AID IN THE CLARIFICATION OF COAL WASHERY WATER, by H. F. Yancey, R. E. Zane, Walter Wood, and J. T. H. Cannarella. 13 pp. 6 figs.
- I. C. 7040. COAL-MINE EXPLOSIVES: THEIR CHARACTERISTICS, SELECTION AND SAFE USE, by J. E. Tiffany. 20 pp. 2 figs.
- I. C. 7046. SAFE STORAGE, HANDLING, AND USE OF COMMERCIAL EXPLOSIVES, by D. Harrington. 13 pp.
- I. C. 7092. COAL-MINE EXPLOSIONS AND COAL AND METAL-MINE FIRES IN THE UNITED STATES DURING THE FISCAL YEAR ENDED JUNE 30, 1939, by D. Harrington and W. J. Fene. 21 pp. 1 fig.
- I. C. 7096. OPEN-PIT MINING AND MILLING METHODS AND COSTS AT THE YELLOW ASTER MINE, RANDSBURG, CALIF., by A. W. Froli. 46 pp. 10 figs.
- I. C. 7098. COOLING MINE AIR DURING SUMMER MONTHS TO PREVENT ROOF FALLS, by C. A. Herbert. 14 pp. 6 figs.

U. S. Geological Survey

- Bull. 906-C. THE MIZPAH COAL FIELD, CUSTER COUNTY, MONTANA, by Frank S. Parker and David A. Andrews. 43 pp. 25 plates. 5 figs. \$1.50.
- Bull. 906-D. GEOLOGY OF THE SEARCHLIGHT DISTRICT, CLARK COUNTY, NEVADA, by Eugene Callaghan. 51 pp. 12 plates. 9 figs. 40 cents.
- Bull. 910-B. PLATINUM DEPOSITS OF THE GOODNEWS BAY DISTRICT, ALASKA, by J. B. Mertie, Jr. 27 pp. 1 plate. 3 figs. 15 cents.

Miscellaneous

- MINERAL TECHNOLOGY AND OUTPUT PER MAN STUDIES: ROCK DRILLING, by C. E. Nighman and O. E. Kiessling, W.P.A. National Research Project and Dept. of Interior, Bureau of Mines. 158 pp. 27 figs.
- GOLDBANKS MINING DISTRICT, PERSHING COUNTY, NEVADA, by Robert M. Dreyer, Geologist, U. S. Geological Survey, U. of Nevada Bull., Geol. & Mining Series No. 33. 36 pp. 13 figs. 30 cents.

SUNEX

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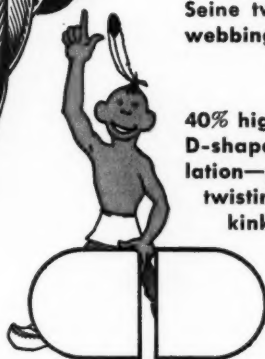
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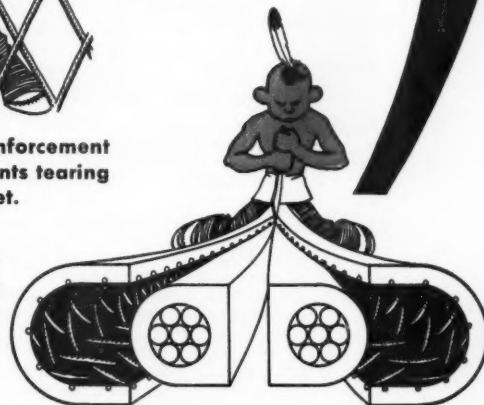
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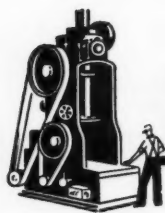
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MANUFACTURERS' Forum

New Bulletin on Spaders

Spaders and trench diggers of Sullivan Machinery Company, Michigan City, Ind., are illustrated and fully described in a new four-page, two-color Bulletin—87-K.



The Sullivan M-2 spaders are built for the toughest jobs, including shaft sinking, tunnel and trench work, and also light demolition. They are easy on the operator. Handle grips fit the hand, an air cushion at the end of the cylinder relieves jar, and exhaust ports are arranged to deflect exhaust away from the operator. They are easy to dismantle.

They are ruggedly constructed with strong, well protected joint connection to maintain perfect alignment and a special heat-treated steel retainer to resist wear from the spade.

Channel Lubricated Roller Chain

A channel lubricated roller chain, which conforms to American standard dimensions and is completely interchangeable with all other standard roller chains, has recently been announced by Morse Chain Company. A particularly ingenious design retains the self-lubricating features of Morse roller chain while adding this complete interchangeability.

Oil applied on the outside surface of the rollers of any roller chain will seep under rollers and lubricate inner roller surfaces turning on the bushings. However, until the introduction by Morse Chain Company several



years ago of a roller chain of unique pin and bushing design, the difficulty was in getting oil past the bushing to the core of the joint—the pin.

In this round-pin Morse roller chain, diagonal channels are rolled into the stock from which the bushing



120 Foot Cascade Marks Westinghouse Exhibit

Extensive improvements are being made to keep the Westinghouse Exhibit at the World's Fair of 1940 in New York abreast of fast-moving developments in science and engineering, according to A. P. Craig, exhibit director. The Westinghouse Building, one of the major industrial attractions at last year's Fair, will present a livelier exterior and a score of new marvels, fresh from the research laboratory.

To symbolize the new heights of technical achievement in the electrical industry, one of the world's highest man-made water cascades is now under construction. This striking new display will produce a symphonic combination of color, light, water and music at the Singing Tower of Light.

Three tons of water each minute will be pumped to the 15 waterfalls which make up the cascade. From the top of the 120-ft. Singing Tower of Light, water will tumble over a multi-colored lighted pylon to an enlarged pool. Underwater lights will cast constantly changing colored beams on the Tower itself and on two 50-ft. water jets which flank it. The Westinghouse Building is on the Plaza of Light in the Industrial Area.

Buried 50 ft. underground in its

Immortal Well at the foot of the Tower, the Time Capsule will be visible, bearing a record of our civilization to the people of 5,000 years hence. Ranged on either side of the Immortal Well cases will stand, in which duplicates of the contents of the Time Capsule are displayed and described by a lecturer.

Elektro, seven-foot mechanical man, will arrive with a bag of 31 tricks, including several new ones he has "learned" during his winter stay in the laboratory of his inventor, J. M. Barnett, at the Westinghouse factory at Mansfield, Ohio.

In the Playground of Science, visitors may operate laboratory marvels, simply by pushing buttons and throwing levers. To create it, Westinghouse research men have adapted some of the latest discoveries to popular use. One, called Hell's Bells, will enable the spectator to manipulate a set of hammers which strike glowing red-hot bells in an electric furnace. One bell, of heat-treated carbon steel, gives off a dull clunk. The other made of a newly developed alloy, rings with a high, bright note. When they cool off, however, both bells give off the same sound. Nearby visitors will turn on an electric light with their breaths. Music will be sent along a beam of light. The vigilant electric eye will be matched by an electric ear.

is formed. When the joint is assembled, these channels appear as spiral grooves and extend through the side plates of the bushing link.

Oil on the rollers quickly finds its way to the bushing surfaces. The channels act not only as reservoirs but as paths for the flow of oil through the side plates and down to the pins, where the lubricant is seized and spread by capillary action in a pro-

ductive film over the entire contact surfaces of pins and bushings.

Single, double, triple, and quadruple widths, all standard pitches, and standard stock attachments are available. Stocks are carried in key cities throughout the country. Complete information on the improved Morse roller chain and its wide field of application may be secured by writing Morse Chain Company, Ithaca, N. Y.

New The STOPEHAMER

It's the Balanced R-58

with Automatic Rotation

EASY HANDLING

The R-58 has fine balance—light weight—short overall length—flexible feed control—ideally located air and water hose connections and throttle control.

Balance—The center of gravity of this Stopehamer is such that it assumes a natural drilling position when it is picked up. This makes it easy to set the drill in any operating position.

Light Weight—Only 116 pounds—yet the fastest Stopehamer Ingersoll-Rand has ever built.

Short Overall Length—Only 59 inches. Short length prevents the drill from being top heavy—means greater safety for the operator and easier handling. Ideal for use in narrow, restricted stopes, as well as in large stopes.

DURABILITY

The R-58 stays underground—this has been convincingly proved in a number of mining districts.

The R-58 piston has greater metal sections than any other I-R stoper piston.

The valve is simple and sturdy.

The chuck cleaning system keeps cuttings and water out of the machine better than any other method we have yet devised. Bearing areas are larger and lubrication is positive.

DRILLING SPEED

The speed and easy handling qualities of the R-58 insure greater footage per shift. This makes skilled miners even more productive.

Ask for detailed information about the cost-cutting R-58—Form 2647. Contact the nearest Ingersoll-Rand Branch. Don't overlook this opportunity to reduce your drilling costs. Get an R-58 to-day.



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915 5

Cleaning Plant Contracts

A contract has been closed with **The Jeffrey Manufacturing Company** for a new washing plant at the Blaine, Ohio, Mine of Lorain Coal and Dock Co. The plant will screen 5-in. by 0-in. coal at $\frac{3}{8}$ in. by means of Jeffrey Traylor vibrating screens. The 5-in. by $\frac{3}{8}$ -in. sizes will be washed in a large 7-ft. Jeffrey Baum jig. The $\frac{3}{8}$ -in. by 0-in. sizes will be sent to a storage bin from which they may be loaded direct in railroad cars or blended with the proper sizes. A flexible arrangement of mixing conveyors will make possible size combinations to meet every requirement of the company. Provision is also contemplated for crushing and washing the entire mine output of 400 tons per hour in the Jeffrey jig.

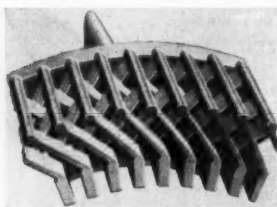
Also to be built by The Jeffrey Manufacturing Company is a new washing plant for Lorado Coal Mining Co., at Lorado, W. Va. Facilities provide for screening 6-in. by 0-in. run-of-mine at $\frac{3}{8}$ -in. on Jeffrey Traylor vibrating screens. The 6-in. by $\frac{3}{8}$ -in. sizes will be washed in a 7-ft. two-compartment Jeffrey Baum jig, and screening facilities further provide for making 6-in. by 3-in., 3-in. by 1 $\frac{1}{4}$ -in., 1 $\frac{1}{4}$ -in. by $\frac{3}{8}$ -in., and a great variety of combinations of these sizes with each other. The $\frac{3}{8}$ -in. by 0-in. slack will be delivered to a storage bin from which it can be blended with the other sizes.

Roberts and Schaefer Company, Chicago, Ill., have been awarded the contract for complete tipple and washer and Hydro-Separator coal washer to be built for Monongahela Rail & River Coal Corporation, Fairmont, W. Va., at their mine at Maidsville, the plant to have a capacity of 250 tons per hour, run-of-mine coal. This is made to crush lump and wash 5-in. by $\frac{3}{8}$ -in. in launder Hydro-Separator, the $\frac{3}{8}$ -in. by 0-in. coal not being treated at this time.

Four sizes of coal will be loaded onto four tracks—5-in. by 1 $\frac{1}{8}$ -in. egg, 1 $\frac{1}{8}$ -in. by $\frac{3}{8}$ -in. nut, $\frac{3}{8}$ -in. by $\frac{3}{8}$ -in. pea, and $\frac{3}{8}$ -in. by 0-in. slack. The plant will be completed July 1, 1940.

"Valv-Amp" Rotor—An Improvement In Induction Motor Construction

Offering the advantage of longer motor life with less maintenance, a new type rotor construction announced by General Electric makes possible



the use of cast-aluminum rotors in the larger sizes of double-squirrel-cage motors for high-starting-torque,

low-starting-current service. Called the "Valv-amp" rotor, it makes use of a unique shape of rotor slot and a special method of assembling rotor punchings to control the flow of starting current. As a result, without the use of a switch or other moving parts, current is permitted to flow in the outer squirrel-cage when the motor is started, thus producing high-starting torque. Then, when the motor comes up to speed, current is allowed to flow through the entire rotor "winding," resulting in excellent running characteristics.

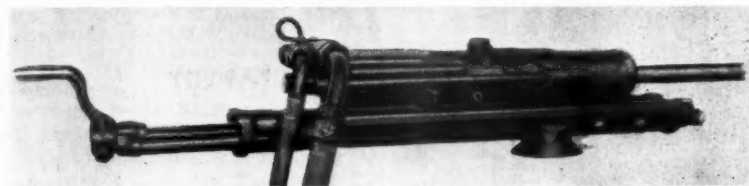
Of the two conventional methods of double-squirrel-cage-rotor construction—i. e., casting the conductor bars and short-circuiting rings integral or joining them by brazing—the former

method is by far the more satisfactory because it is a simpler operation, with smaller chance for human error, and results in a more compact, uniform product. However, until the Valv-amp development, it has not been practicable to cast double-squirrel-cage rotors in the larger sizes.

The Valv-amp development, however, allows the construction of larger cast-rotor motors which inherently combine the advantages of the double-squirrel-cage motor, such as high-starting torque, low-starting current, and excellent running characteristics, with advantages of the conventional cast-rotor motor—simplicity of construction, long motor life, little maintenance, and permanence of electrical characteristics.

One-Man Drifter

Described as a true one-man drifting drill, a new, light, 2 $\frac{3}{4}$ -in. drifter, known as the D-73, is announced by the Gardner-Denver Company. This new drifter weighs only 118 pounds, and, according to Gardner-Denver officials, has unusual ability to rotate in tight or fitchery ground. In actual operation, the D-73 has shown itself admirably suited for use in moderate ground, in small headings, in remote working places and in locations difficult of access with heavier drills.



The D-73 drifter is the equal of most 3-in. drifters in drilling speed and power of rotation, field tests show. At the same time, its air consumption is said to be lower in proportion to its smaller bore. Gardner-Denver executives explain that the modern high performance of the Gardner-Denver "H" valve is incorporated in this drill, permitting unrestricted admission of air with an extremely short valve stroke. In addition, the D-73 has powerful four-pawl rotation, the pawls being reversible for double wear.

Wire Rope Clamp

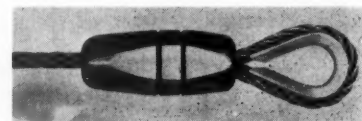
The "Safe-Line" wire rope clamp, manufactured and marketed by the National Production Company of Detroit, Mich., has the following features, according to the manufacturer: Neatness in streamline design, double holding power, ease of assembly, safety for employees, and low cost.

The inner surface that grips the wire rope is double spiral splined to fit each strand and wire of the rope, thus making a perfect and secure grip on each section of each wire and strand. The gripping halves of the clamp are held tightly to the rope by taper-threaded nuts. The clamp is

Until now, when conditions necessitated a drill lighter than the 3-in. drifters weighing 130 pounds or more, it has been necessary to attach a 55-pound hand drill to a mounting, bringing the weight of the combination up to approximately 115 pounds. The Gardner-Denver D-73 drifter has the mounting ways integral with the cylinder. It is made in three types of chuck construction—lug shank steel, 1-in. to 1 $\frac{1}{4}$ -in. round; collared steel, $\frac{3}{8}$ -in. or 1-in. hexagon or quarter octagon; and tappet construction for

straight shank steel, hexagon or quarter octagon.

Other construction features include: drop-forged cylinder with a bushing having a renewable bronze liner; $\frac{3}{4}$ -in. side rods of special stock with long cap nuts to protect the threads; a large central chuck driver flange which absorbs end thrust; large oil reservoir surrounding the cylinder bushing that feeds oil automatically to all working parts of the drill, and guide shell mountings in either the solid cone or sliding cone style available.



made of high tensile strength steel and is guaranteed to outpull any wire rope made. Stock sizes are for ropes $\frac{1}{8}$ to $\frac{3}{4}$ in.

Unlike a spliced joint or zinc-in socket, a joint made with a "Safe-Line" clamp can be quickly readjusted to the proper tension without additional expense, and it can be used over and over again. The company will gladly furnish full details.

Unbreakable Mercury Relay

Of interest to industry everywhere is the announcement of the Durakool Mercury Relay, utilizing the unbreakable metal body of the Durakool Mercury Switch and the displacement principle with solenoid actuation. The new mercury relay embodies several outstanding features. The contact structure is hermetically sealed, making the relay especially suitable for use in corrosive or explosive atmospheres. The relay may be operated up to 300 times per minute, with little friction and wear in operation. The inherently rugged and simple construction eliminates risk of breakage in shipment or operation, and the relay is said to require no maintenance or attention.

Compact Washer Speeds Bearings Maintenance

Simpler, faster, and more economical washing of the large bearings up to 12 in. diameter, used in mine equipment services, is accomplished by the Croft bearing washer. In operation, the container is filled half full of cleaning fluid; the bearing is placed on the cone, and the gun is employed



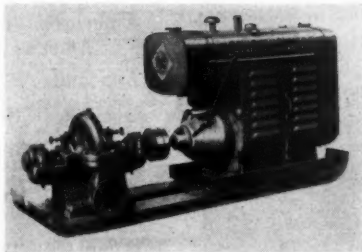
to force cleaning fluid all through the bearing.

This maintenance item is sold separately or in connection with the Croft truck bearing packer, both exclusively distributed by Ahlberg Bearing Company, 4734 South Whipple Street, Chicago, and its branches.

Engine-Driven Pumps

To provide independently powered pumps for drainage, irrigation, gravel and coal-washing plants, construction jobs, and similar applications, the Allis-Chalmers Mfg. Co. has introduced a line of centrifugal pumps driven by gasoline power units. Since these units are entirely independent of any outside source of power, municipal and private water suppliers use them as standby units in emergencies when other sources of power fail.

Power units in five sizes (18 to 110 hp.) assure economy in operation with



a choice of fuels: Gasoline, kerosene, distillate, natural gas, or butane. All power units have valve-in-head medium-speed engines, with removable cylinder liners, efficient cooling systems, forced-feed lubrication, and a variable-speed governor.

The centrifugal pumps are horizontal shaft, single stage, single or double suction pumps designed for handling liquids at normal temperatures with maximum efficiency. To facilitate handling, the engines and pumps are mounted on a base and are available in many combinations to meet various requirements in quantity and pressure up to 5,000 gal. per minute and 100-ft. head.

A folder (Form MS 253) describing these engine and pump units may be obtained from the Tractor Division, Allis-Chalmers Mfg. Co., Milwaukee, Wis.

Improved Pacific Scrapers

Alloy Steel & Metals Company, 1862 East Fifty-fifth Street, Los Angeles, Calif., announces important improvements in Pacific all-manganese steel scrapers for underground slushing operations. The company has ready for distribution an attractive six-page bulletin, No. 95, which illustrates and concisely describes these scrapers.



Included in the pamphlet are graphs showing dimensions and power requirements, and several tables giving other necessary information.

The company also has ready for the trade Bulletin 96, containing descriptions and illustrations of the new



Pacific sheave blocks of improved design, particularly adapted for use with slushing scrapers. These two bulletins may be obtained from the company.

CATALOGS AND BULLETINS

• **BATTERIES.** *Gould Storage Battery Corp.*, Depew, N. Y. Mechanized Mining Bulletin presents advantages of company's Kathanode Batteries with specifications, for use in shuttle car haulage. 4 pages.

• **BEARINGS.** *New Departure*, Bristol, Conn. Book entitled "Why Anti-Friction Bearings" is an impartial discussion of the factors to be considered in the selection of anti-friction bearings. A fairly exhaustive treatise in very readable style, profusely illustrated, the book is designed for use as a textbook in the engineering colleges and is very helpful to young engineers and others who have a serious interest in all factors affecting the efficiency and performance of machines through the use of anti-friction bearings. 112 pages.

• **BELT FASTENERS.** *Flexible Steel Lacing Co.*, 4607 Lexington St., Chicago, Ill. Bulletin F-100 describes company's Flexco HD Belt Fasteners and Rip Plates, giving complete details and list prices for the six sizes which can be used to join conveyor and elevator belts from 1/4 in. to 1 1/2 in. thick, of any width.

• **BELTING.** *American Leather Belting Association*, 100 Gold St., New York City. Data book presenting information permitting rapid and proper selection of Short-Center Motor Drives, giving proofs of advantages of these drives as compared to other types, with numerous examples. Book is a valuable reference on individual machine drives and drives from motors to line shafts, and is, in the words of the publishers, "a fitting and even more useful sequel to Robert Drake's splendid 'Bible' on power drives, issued some years back." Available to interested persons upon writing any leather belting company or the association.

Chicago Belting Co., 113-125 N. Green St., Chicago, Ill. Complete condensed catalog of company's full line of Tension Welded Leather Belting, with engineering counsel on belt drives, line shaft systems, and leather packing. 24 pages.

The B. F. Goodrich Co., Akron, Ohio. Catalog 2180 explains the problems of selecting a V-drive using stock belts in simple terms to be understood by purchaser or operator without professional engineering training. The following information must be known before a drive is selected: Type of machine and work to be done, r.p.m. of driving shaft, r.p.m. of driven shaft, prime horsepower of motor or other prime mover, and space limitations. 24 pages.

• **CHAINS.** *Morse Chain Co.*, Ithaca, N. Y. Bulletin R-54 gives complete and detailed information on construction, capacities and applications of company's Roller Chain, a drive which is completely interchangeable with all other round pin roller chains, which contains a positive oil feed system in every link. 28 pages.

• **CLIPS FOR WIRE ROPE.** *American Hoist & Derrick Co.*, St. Paul, Minn. Catalog CCB-13 describes and illustrates a large number of applications of Crosby Clips for fastening wire rope in every kind of service, with helpful data on correct ways to install. 36 pages.

• **COAL MINE EQUIPMENT.** *Sullivan Machinery Co.*, Michigan City, Ind. Bulletin 50-C covers the full Sullivan line of equipment for coal mines, including various types of coal cutters for kerf thicknesses from 2 1/2 to 6 in.; track cutters; dual-duty machines for either shortwall or longwall operation; two-speed power trucks; room hoists; car pullers; scraper haulers; rock loaders; portable, semi-portable, and stationary compressors; rock drills; stoppers; channel cutters; bit heaters and sharpeners; and miscellaneous accessories. 16 pages.

Operators Who Look for "Plus Values"

Choose Gardner-Denver Mine Car Loaders



**"LOADS SEVENTY 23 cu. ft. CARS
Per 8-HOUR SHIFT!"**

On one of Canada's most prominent gold mining properties, mucking has been done by quickly trained new operators. The average for an 8-hour shift has been seventy 23 cu. ft. cars. Accurate cost records kept by this efficient management show the maintenance expenses on the GD-9 loader were only \$1.00 for 10,000 tons of muck handled.

THE "passable" performance of any mine car loader will better the record of hand mucking—but why not get the plus value of a Gardner-Denver Mine Car Loader? Here's a mine car loader that will give you fast, reliable, efficient operation under all types of mining conditions! Two specially designed radial air motors have proved their ability to furnish adequate power for every mucking job. One motor crowds the dipper into the most stubborn muck piles—the other lifts the load—a full dipper every time.

Talk about economy! GD-9 loaders use no more air than a drifting drill. In the field—under actual operating conditions—owners' reports show that maintenance costs are exceptionally low.

Find out how you can get the most from your investment in a mine car loader—write for complete details. Gardner-Denver Company, Quincy, Illinois.

GARDNER-DENVER
SINCE 1859

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DIAMOND CORE DRILLING

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Our specialty—Testing bituminous coal lands
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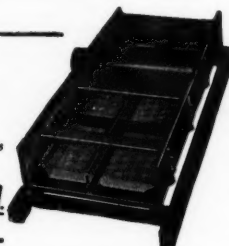
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We Look Into the Earth

By using Diamond Core Drills. We prospect Coal and Mineral Lands in any part of North or South America.

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THESE *New Booklets* WILL REALLY HELP

● Here are three of the most constructive little booklets recently produced in the industry. They are far more of a data or reference book than an advertisement. Most of the pages devote themselves to recommending the particular construction, grade and type of rope best suited to individual applications.

And the booklets are specialized, too. One for the strip mine operator—one for the man who handles coal—one for shaft mining and special mine applications. The latter book not only carefully specifies the exact rope needed for a particular job or application, but carries ready-reference tables of strengths, weights and prices of all wire ropes (sizes and constructions) commonly used in mining. For your **free** copies, sign and return the coupon—today. In the meantime:—

BUY ACCO QUALITY whether of *American Cable Wire Rope—American Welded Chains—Page Welding Wire—Page Wire Fence—Ford Chain Blocks—Reading-Pratt & Cady Valves—or any other of the 137 ACCO Quality Products.*

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AMERICAN CHAIN & CABLE COMPANY, INC.

MINE CAR BOTTOMS

By REAMY JOYCE
District Sales Manager
The Wood Preserving Corporation

MANY bituminous mines are using composite mine cars, which consist of steel bodies with wooden bottoms and bumpers. The steel bodies are subject to corrosion. In wet mines where the coal is high in sulphur, corrosion proceeds rapidly.

Formerly most mine managements believed that untreated wood mine-car bottoms failed from mechanical wear. Now a number of coal companies know that when preframed creosoted oak bottoms are used, mechanical destruction, so-called, does not take place at the time when the untreated bottoms failed, but is postponed for a considerable period.

One large bituminous coal company placed in service 1500 composite mine cars, of which 300 had preframed pressure-creosoted pine bottoms and the remainder had pressure-creosoted oak bottoms. In the nine years of service, the pine bottoms showed definite signs of failure from abrasion. The oak bottoms still showed very little evidence of wear. The actual average life of the creosoted oak bottoms is not yet known. It will probably be not less than twelve years.

The approximate cost of a 4-ton composite mine car with copper-bearing steel sides, steel wheels, antifriction bearings and untreated white oak bottom, is \$275. The steel sides of the car would have an estimated life of twelve years. White oak bottoms untreated have produced a life of from five to six years. Mixed oak bottoms untreated last about four years. Untreated oak bottoms fail primarily from decay. The added cost of preframed and bored creosoted oak bottoms in new cars is \$8.50 and the life of this bottom is estimated to be the same as the life of the copper-bearing steel. This added cost is only 3 percent of the cost of the composite car with the untreated wood bottom. The replacement costs of wood bottoms in cars in use are:

PRESSURE-TREATED TIMBER PAYS FOR ITSELF

In 1928, 1929 and 1930, in a certain group of bituminous coal mines, 223,258 main haulage hardwood mine ties were installed. They were pressure-treated.



TREATED TIES \$0.7133 EACH
UNTREATED TIES 0.4017 EACH
0.3116 EACH

COST OF UNTREATED TIES (RENEWAL) \$0.20355
LABOR RENEWAL 0.488
SPIKES 0.04
\$0.82155
FIRST RENEWAL OF 223,258 TIES
AT \$0.82155 — \$183,417.61

1 It cost \$69,600.00 more to use treated ties than it would have cost to use untreated ties. But the untreated ties had a service life in those mines of 3.7 years, whereas the treated ties installed in 1928 have already served almost 12 years, and the evidence is that all the treated ties will last 12 to 16 years.

2 If untreated ties had been used, approximately all the 223,258 ties would have had to be renewed at the end of 3.7 years. Even figured at \$19.00 per thousand board feet instead of the 1928-1930 cost of \$26.00, this would have cost \$183,417.61.

SECOND RENEWAL OF 223,258 TIES
AT \$0.82155 — \$183,417.61

FIRST RENEWAL OF UNTREATED TIES \$183,417.61
SECOND RENEWAL 183,417.61
\$366,835.22
LESS ADDED COST OF TREATED TIES 69,602.53
SAVINGS TO DATE BY USE OF
TREATED TIES \$297,232.69

3 By this time, another complete renewal would have had to be made, and even this third set of untreated ties would now be rapidly nearing the end of their service life, and the mine owners would be facing a third renewal.

4 Comparable savings can be shown in other cost studies on mine ties pressure-treated with creosote. For the sake of your own costs and profits, use pressure-treated ties, timbers, bridges, and other construction in and around your mines.

OTHER USES FOR PRESSURE-TREATED TIMBER: Tipples · Pillings · Guard Rails · Fences · Poles · Buildings, Bins, Sheds · Piers, Docks, Wharves · Platforms · Flooring · Tanks, Sumps, Vats · Crossing Plank · Barge Sides and Bottoms · Cable Ways · Conduits · Culverts · Flumes · Trench Lining and Covers · Conveyor Decking and Supports.

OTHER KOPPERS PRODUCTS FOR THE MINING FIELD: Coal Preparation Plants · Coal Tipples · Boiler and Power Plants · Mine Shops · Fast's Couplings · American Hammered Piston Rings · Cylinder Packing · Bronze and Iron Castings · Flotation Oils · Bituminous-base Paints · Coal Tar Roofing · Waterproofing · Tarmac for paving.

THE WOOD PRESERVING CORPORATION
PITTSBURGH, PA.

a K O P P E R S subsidiary

	Preframed Creosoted Oak	Untreated White Oak		Preframed Creosoted Oak (12-Yr. Life)	Untreated White Oak (6-Yr. Life)
Lumber	\$11.50	\$4.75	Original Added Cost...	\$8.50	\$0.00
Bolts and Nuts	3.75	2.75	Present Worth @ 4% 1st renewal, 6 years	0.00	15.46
Labor	9.68	11.06			
Cost per Car	\$24.93	\$19.56	12-Year Cost	\$8.50	\$15.46
			Saving Per Car		6.96

The "capitalized cost" method of cost comparison is the first cost plus the sum of the present worth of all successive costs. Using this method, we arrive at the following capitalized cost comparisons:

Since the company has 6,000 composite mine cars in service, the total saving is \$41,760. This amount is the present worth of the saving resulting from the use of pressure-creosoted mine-car bottoms.

61
61
22
53
69

34